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REDWOOD

AND LUMBERING

— IN —

CALIFORNIA FORESTS.

WITH ILLUSTRATIONS.

SAN FRANCISCO, CAL.
EDGAR CHERRY & CO., PUBLISHERS,
434 CALIFORNIA STREET.
1884.

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Bacon & Company, Printers.

INTRODUCTORY.

THE PUBLISHERS, in presenting this work to the Public, feel confident that their endeavor will meet the wants of a large number of people, both on the Pacific Coast and abroad.

The visitor in the heart of the Redwood belt invariably departs therefrom with a desire that he may take with him something suggestive of its grandeur and beauty. Without relying upon his memory or his descriptive faculty, for imparting to others what methods are employed in the felling, logging, and transporting of these monster trees to sawmills, as well as the equally giant proportions of the machinery used in reducing them into building material, the visitor finds in this work, at least, memoranda of unquestioned truthfulness.

Photographic views of Redwood trees, logs, booms and logging trains have been taken before to a limited extent. These, however, were mounted separately upon heavy cardboard, and liable to be appropriated by "admiring friends."

The Publishers believe no one ever before attempted the photographing of the "Evans, Third Saw"—really, four saws. The light in mills for this work is poor at best, and a perfect view is impossible to obtain, but one sufficient to give the stranger an idea of the method of operation is presented.

The almost constant fog that hangs over the Redwood belt makes it difficult also to obtain good views of the forests and logging camps.

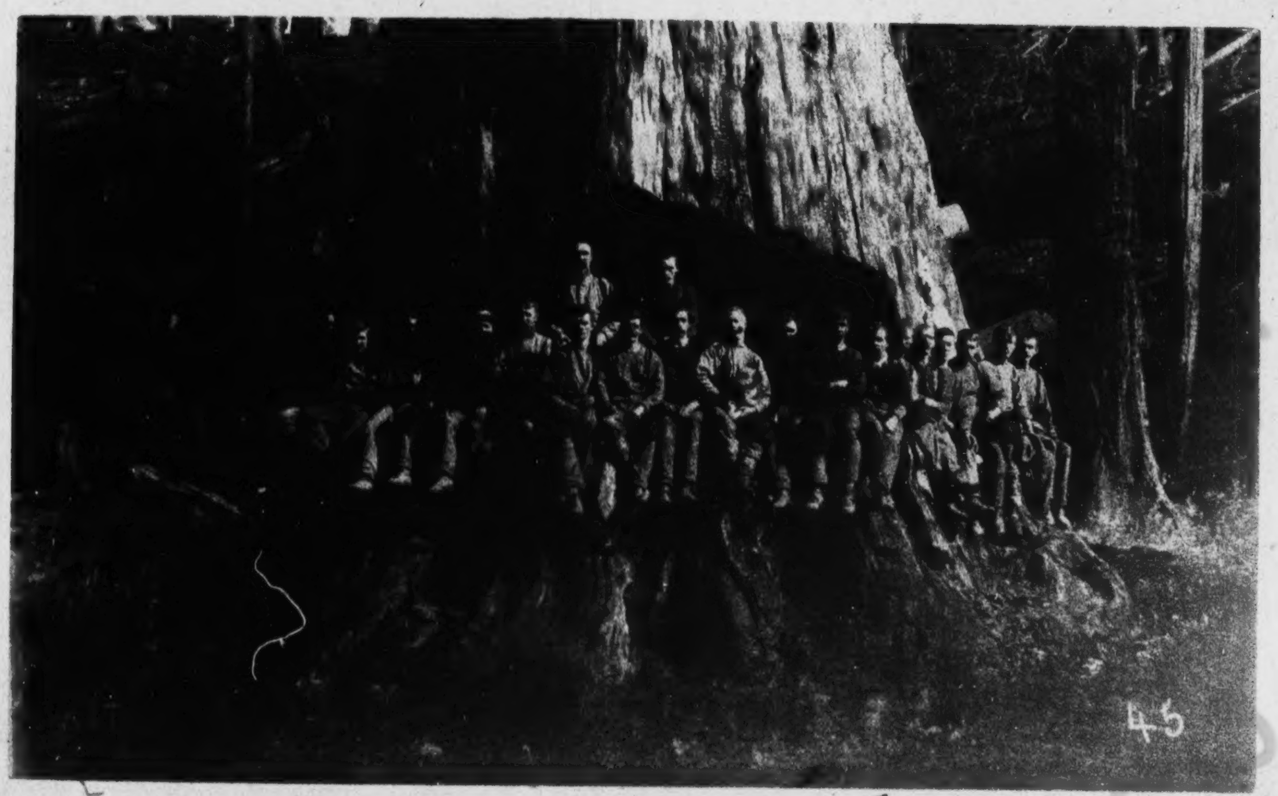
DR. KELLOGG, of the CALIFORNIA ACADEMY OF SCIENCES, and author of "*Forest Trees of California,*" has, by special request, written an article for this work of an historical character, showing the relationship of the Redwood to the Mammoth trees and others of the cedar genus. An article on the Redwood so complete in detail has never before been published.

In their descriptions, the writers have studiously avoided the use of technical names, so that any one can understand who reads.

To many persons the price of this work may appear somewhat extravagant; but when it is taken into consideration that similar views, mounted upon cards, sell at retail for $5.00 per dozen, the book will appear comparatively cheap. Especially will it be conceded that the work is not placed above its value, when one considers the time and labor of the writers in the compilation of detail matter, material and scientific research.

The object desired to be attained in presenting views by the photographic process is, to set aside all doubt as to the enormous growth of the Redwood, the number of feet per acre, and the superior qualifications that will recommend it to builders and others. Inasmuch as engravings are usually cut from sketches, drawn perhaps by enthused artists, perfect satisfaction is not given; but with photographic views, which cannot lie, argument as to truthfulness is unnecessary.

EDGAR CHERRY & CO.
PUBLISHERS,
434 California Street, San Francisco.



IN THE REDWOODS. Dolbeer & Carson's

REDWOOD LUMBERING.

Twenty-five or thirty years ago—long before the era of Continental Railways—our Eastern and trans-Atlantic cousins read in letters from our people of California, of its wonderful scenery, climate and productions, with incredulity; they believing, perhaps, that the then wanderers from the old homes and hearthstones to the jumping off place on the American continent had produced a sort of epidemic in the way of boasting of the new Eldorado; perhaps as much to keep their courage up in their solitude, as to impress upon far-away relatives that they were not unhappy and pining to return to the homes of their fathers.

Trustworthy people, even, who wrote of the grandeur of Yosemite; of the immensity of the Big Trees in Calaveras, Merced and Santa Cruz; of Calistoga and the Geyser Hot Springs; of the wheat and vine yield; of the fruits, flowers, gold and silver veins, were marked as having become imbued with the boasting that was believed to be especially a characteristic of the Pacific slope.

Not until the completion of the Central Pacific railway, when the dangers and monotony of a sea trip were removed, and speedy and comfortable passage by land made a trip to the Pacific slope one more of pleasure than a tedious journey, did tourists and sight-seers investigate for themselves the wonderful field that had been so enthusiastically praised by the Argonauts of California.

Of all that has been told or written by travellers and correspondents concerning California scenery, its huge growth of beets, melons, squash, pears, and fruits of all descriptions, the least attention has been called to our grand forests of Redwood. This, however, is not much a matter of surprise, as the facilities for a careful inspection of this favorite building material are quite or nearly as primitive as during the early settlement of the State. Especially is this the case in the northern section of the State, where the redwood belt has greater width, and from climatic causes has developed a heavier growth of timber. Not only are the trees in this northern section larger in circumference, but they attain a much greater height, and withal give a product to the millmen that is far superior in quality to that obtained in the southern extremity of the redwood belt, where the fogs, which is the principal promoter of redwood growth, are not so heavy or continuous during the summer or dry season. While the lumber from the redwoods of Monterey, Santa Cruz, San Mateo, Marin, Sonoma and the lower or southern portion of Mendocino is hard, flinty and springy, that of Humboldt and the northern portion of Mendocino is particularly soft, and runs to a much higher average in clear stuff. Carpenters and other wood workers are especially particular in selecting the northern coast product, when procuring lumber for finishing purposes. They state that the flinty redwood of the southern portion of the belt is difficult to dress and nail, even while the lumber is in its green or unseasoned state. For railroad ties and posts, however, the southern wood answers well. As a demonstration of this fact, at J. P. Pierce's Coffin Manufactory in Santa Clara the best quality, in a finely finished style, is manufactured from Humboldt lumber, although Mr. Pierce has a saw-mill on the San Lorenzo river, in the Santa Cruz mountains.

The area of redwood timber in the lower counties is circumscribed at best, most of it having been cut in earlier days to satisfy the demand for farming purposes, and not so far to be transported by water and teams. While not wishing to depreciate the value of our southerly neighbors' lumber product, it is but justice to the uninformed abroad to give the facts as they really exist.

Under the most flatttering aspect of affairs—taking into consideration the present sparsely timbered section along the southern Coast Range—there is no lumber fit to export to foreign ports, nor do their lumber manufacturers have an ambition to compete for such trade.

It is only necessary for parties at all interested to visit the southern and northern parts of the California redwood belt, to at once become convinced of the superiority of the quality of redwood grown in the higher latitudes.

While we do not claim that for all purposes redwood lumber is the best, we do claim that for the larger proportion of work for which lumber is required, the redwood stands the highest.

There are many reasons for this. First of all, it does not shrink of any importance. The lumber—green from the saw—is in many instances put in its place, and its moisture only evaporates while the building is being constructed. In fact, until very recently, lumbermen have made no effort to keep a seasoned stock on hand. Another reason is the non-inflammable nature of the redwood. It is worthy of note that all the large towns and cities built from this material have escaped destruction by fire in a marked manner; especially when there has been any assistance rendered by even an inefficient fire department. Time and again have interior towns constructed entirely of pine been consumed by flame, while the seacoast towns built of redwood have escaped; many of them having landmarks in the more populous thoroughfares today that were erected a quarter of a century ago. For this reason particularly is redwood the most desirable in constructing farm houses, residences in suburbs of towns, and other buildings dependent entirely upon arrangements made by owners for self-protection from fire. That redwood will burn under favorable circumstances there can be no question, and assertions to the contrary are ridiculous. But that it has great advantages over pine, no one disputes. The reason simply is, that redwood contains no pitch or resinous matter by which fire is fed.

One of the most important purposes for which redwood can be utilized is finishing the interior of all classes of buildings, where perfect joints are necessary. It is well known that pine, even after it is believed to be perfectly seasoned, is very likely to shrink and develope a poor joint. In this particular redwood stands highest of all building material, particularly after it has been given a fair opportunity to become seasoned.

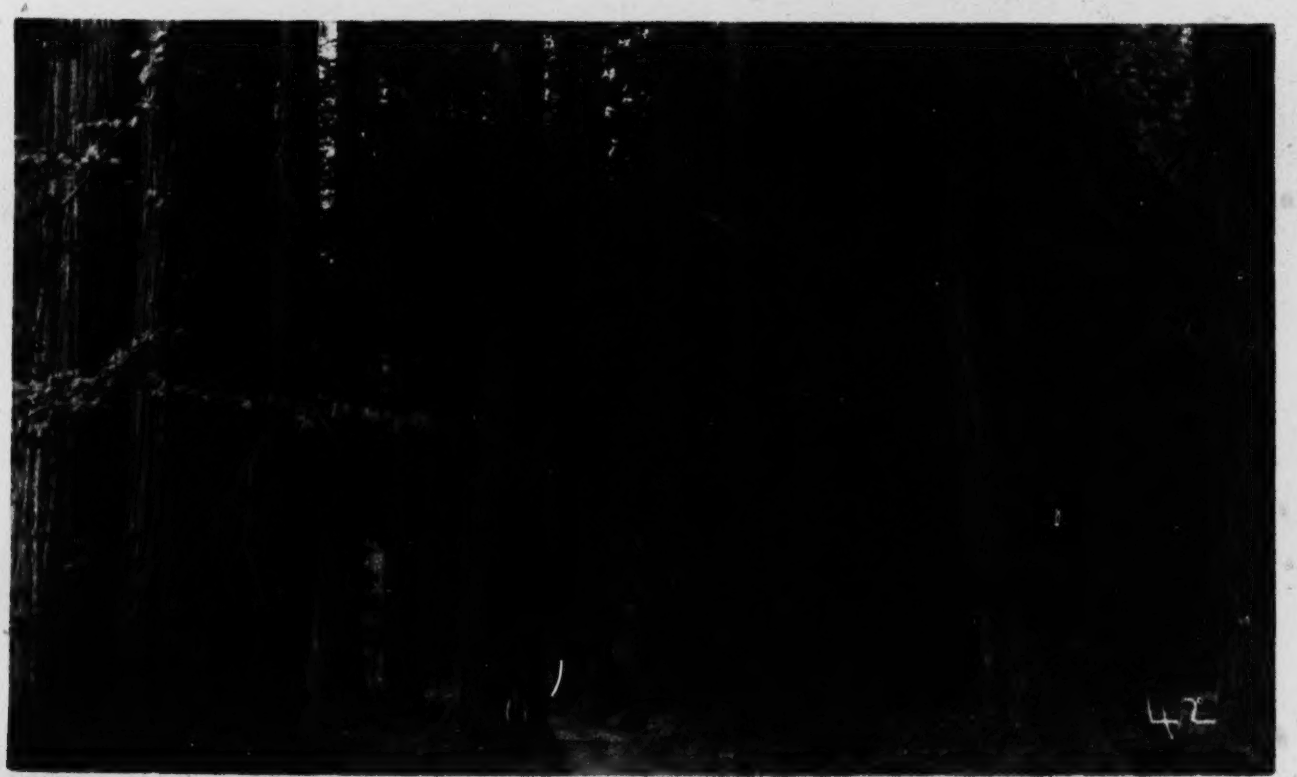
Of late years our wealthiest people have become impressed with the fact that redwood in its natural state furnishes the best material for interior finish; not because it is comparatively cheap, but because of its beautiful color when polished. Some of the most expensive and richly furnished houses erected within the past two years in San Francisco have been finished in redwood. The color of the wood varies, when polished, from a light cherry to a dark mahogany. The darker colors come from trees grown upon bottom lands, and the lighter colors from the lighter soils of mountain and hillside. Variation in color, therefore, partakes of the richness of the soil, as also does the size of the tree itself. The bark of the tree grown on the rich bottoms of the Eel, Van Duzen, Elk and Mad Rivers, as well as in the larger creeks tributary to them and the sloughs extending inland from Humboldt Bay, are very dark and thick, while on the side-hills they have thin bark and are very light in color, varying gradually from the foot of a hill to its ridge, the wood itself being softer and lighter as a higher altitude is attained.

Speaking of the uses of redwood, no better article on the subject has found its way into print than the following from the S. F. "Bulletin" of September 8th, 1884. This influential journal has justly earned the reputation of a close observer of passing events and their bearing on future results. It says:

"ILLUSTRATIONS OF INDUSTRIAL ART.

"It is not many years since fences in some parts of Indiana and Illinois were made of black walnut rails. The material seemed to be a good substitute for the chestnut rails used in other Northern States. The softer kinds of black walnut could be split with ease, and when seasoned the wood was light, and lasted very well. There were hundreds of miles of this fence. At a later day, when black walnut timber became scarce, these fences were drawn upon for lumber, which was selling at sixty to seventy dollars a thousand feet, and which has since advanced far beyond these figures. Every black walnut stump finally came to be considered valuable. They were dug up and converted into the choicest cabinet lumber.

"A similar experience will at no distant day be recorded in California. One of the handsomest house interiors in this State is finished largely with redwood in native colors. The hall, especially, is not only a work of art, but it is a capital illustration of what may be done with this wood. The rough material consisted of a number of butts and stumps of trees, which were sent down to the proposed builder of the house in Alameda county. When he saw the consignment he was strongly tempted to order the stumps pitched into the bay. They were finally sent to the planing mill, sawed into the requisite boards and scantling, and returned to the builder. The spacious hall is entirely finished, ceiling and all, with the redwood which came from these stumps. The panel work is in excellent taste, and the entire finish has produced an effect



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quite superior to Mexican cedar, and to most of the hardwoods of the tropics. The heavy coats of varnish have been rubbed down, until a hard enamel has been obtained; the many lines and curves of the grain in the wood have been brought out, and the rich tones preserved.

"It has long been well known that redwood made a superior finish for house interiors. But for the most part it has been covered up with paint, and the effect of all the natural colors and tones spoiled. Of late some attention has been turned to the fine effect which may be produced by the use of this wood in natural colors for interiors. Here and there a dining-room or a sitting-room may be seen partly finished in redwood, the builder being a little chary of a too liberal use of the material, as if he were trying an experiment which might or might not be successful. But the employment of redwood in natural colors can no longer be called an experiment. The best of this material, which is the butt logs and stumps, including the roots, furnishes as handsome a grain as is found in any of the more costly woods. It is probable that this part of the tree furnishes the hardest timber, as it certainly furnishes quite the handsomest. One can hardly fail to observe the strong tendency just now to substitute wood finish for plaster in house interiors. The reign of stucco is disappearing. With it also the painted interior is disappearing. That handsome native woods should be covered up with lead and oil is a usage without a good reason behind it. The white stuccoed interior went with the glowing white exterior.

"At this stage of the transition high colored papers are much employed for interiors. Many of the papers have "stunning" colors. They are loud and obtrusive. A great deal of industrial art has been expended in producing these papers. But this very art has had a better training, and is now producing papers in far better tone; the low reliefs and neutral tints will finally prevail. The next step for the more costly interiors will be the finest finish in native woods. This finish need not be costly. That depends not upon the material, but upon the amount of work put upon the native woods. Of course there can be a great deal of costly carving, which, if it does not produce the best artistic effect, will at least serve to catch and hold all the dust that may be floating around the room.

" The area of redwood timber in California does not vary greatly from the original area of the black-walnut timber belt in northern Ohio, Indiana, and Illinois. That area has been now so circumscribed that black walnut has become as costly as the hardwood timber from the tropics. Precisely the same processes are going on in California. Redwood is used for fencing material, for the covering and interior finish of wood houses, for barns, and largely for bridges, especially for the sills and sleepers, which resist decay. An instance was recently cited where the owner of a large farm, being about to build a house, discovered that the redwood boards which had been employed to a large extent for fencing his land would make an excellent material for the interior finish of his dwelling. Many of these boards had the handsome wavy grain frequently noticed in the butt logs and stumps of redwood. The boards were well seasoned. The result was that the house-builder secured an extra fine finish for the interior of his house, and in this way furnished a capital illustration of industrial art. The day will come when, as in the case of black walnut, redwood will no longer be used for fencing material, because it will be too costly. Then it will be found that furniture, including book-cases, bedsteads and bureaus, will be constructed of this material; in the face of the objection, too, that it is too soft a wood for such uses. Old stumps will be dug up and sent to the mills, to be converted into the choicest lumber for interior finish, and many a carved root of redwood will figure in the future house. The transition has already begun.

" What a pity that so much of this material will go into house interiors only to be covered up with unwholesome and glaring white lead, more glaring frequently in the finish known as China gloss! If one is to build a costly wood house, why not enjoy it for its truthful qualities? Why cover up all the interior, as if one were ashamed that wood has been employed at all? The industrial art to be employed in house-building in the future will go quite beyond the external architecture. Whatever the exterior walls may be, the interior finish will be largely of wood. There will be more simplicity and more truthfulness in interior decorations. Honest native woods will be employed. It will also occur to the coming industrial artist that these woods, for the most part, need not be disguised in paint, but may be left in their native honest tones and colors."

In connection with the above, we may here state that variety of shade in redwood is one that recommends itself most highly to fanciers of superb finish. There is the dark mahogany color of the roots and butts, the cherry-red color of the two first cuts, and lighter shades running almost to a white, combining the grain of nearly all the very expensive foreign woods such as the polisher may desire to imitate. The buhl—a very common growth on the sides of the redwood, and in size all the way from pumpkins to a sixty-gallon cask—makes a veneer in dark color that is not exceeded by the finest imported black walnut. Then there is the short and long wavy specimen of redwood, the bird's-eye, and large curl specimen—these, however, are not very abundant, but sufficiently so to supply a large demand as finishing in native colors becomes more and more popular. As a rule, the stumps and roots of the straight-grained trees can be utilized for fine paneling, should the demand exceed the amount now furnished by whole trees of the specimens above named required for present supply. It is only of late that lumbermen have put any more value than merchantable upon logs which can be manufactured into the finest quality of lumber for fancy finish to the interior of expensive buildings, furniture, etc.

For all ordinary uses, when paint is to be applied, the straight-grained redwood is by far the most preferable, and it is well that it is so, for the real fancy article will not average one per cent. of logs cut. The straight rift, however, shows to fine advantage when finished in natural colors, and used for wainscoting, paneling, and ceiling in connection with white pine or white cedar. In selecting redwood for underground work where it comes in contact with the earth, it should be understood that all descriptions of the wood will

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not resist decay to the extent that a majority of our people have been led to believe. It is not safe to depend upon anything above the second cut from the butt log, where it is required of the wood to withstand rot. In fact, to be safe, butt logs alone should be used when the lumber comes in contact with the ground. As posts, split pickets, shakes, and shingle bolts are invariably cut from the butt end of the tree, because of the greater ease in splitting them, no mistake can easily be made in selecting them, though it is believed that even the butts of trees grown on very high land will decompose when in the ground.

After cutting off fifty feet of an ordinary redwood, one say, that 120 feet will go into logs, the timber becomes softer, and in most cases will decay nearly as quick as common pine. The regular action of the atmosphere, with its winds and rains, has no bad effect upon the top wood, other than the natural wear which is common to all classes of pine or cedar.

One of the great advantages of the lumberman, or post, shingle, and tie-makers following his or their vocation in Humboldt or Northern Mendocino, is the great quantity of clear stuff which is procured from the forests in those localities. John Vance, one of the oldest lumbermen of Humboldt, estimates that his lumber will run 70 per cent. clear. The average of the country, we think, will not run as high as Mr. Vance's estimate, but will not be less than 60 per cent. clear. It is this large percentage of clear in the redwoods of Humboldt and northern Mendocino that will, in the future, add more to the manufacturer's profits in this locality than in any other lumbering district of the Pacific coast. Now that there are two through railroad lines to the East, and arrangements completed whereby another is to be added, our lumbermen feel positive that freights will be placed at figures through which they can compete for trade east of the Rocky Mountains. Of course there does not appear to be any probability of shipping other than the clear stuff for years to come, but the over-production of clear heretofore, and no outlet for it, has been a continual cause of complaint.

The California Redwood Company (the largest in this line on the coast) has already taken the initiative step looking to a supply of clear seasoned lumber for the Eastern market. At Tormey Station just below Port Costa, and convenient for shipping both by rail and sea to all parts of the world, they have built wharves and opened a yard covering some twenty acres, where their lumber can be seasoned properly before being offered to the markets abroad. Evidently the course pursued by the California Redwood Company will be followed by others, as the introduction of this superior article of lumber opens a fresh demand in entirely new fields of consumption. John Vance, Dolbeer & Carson, and other lumbermen feel satisfied that to find outlets for the first quality of lumber, seasoning yards, near favorable shipping points, will be required. Some of these yards may be located at other convenient points besides San Francisco—say at Wilmington or San Diego. At any of these points an active competition can be made with eastern manufacturers of clear lumber. Once let builders at the East be thoroughly convinced, as we are, that redwood is superior for interior finish, and our local market will seldom become glutted with an over-product.

Many will argue—and justly, too—that it would be better for the country that a demand which causes such a draft upon its lumber resources should, by some manner of means, be restricted, and that if high rates of freight will prevent the rapid denudation of our forests, they had better be maintained by the railroad corporations. Others can argue, however, that owners of timber lands can assist in reproduction by a slight effort in the way of timber culture, and thereby extend the supply to an indefinite period. It would be difficult to select any species of forest timber, of which lumber is manufactured, that is given to reproduction so generously as the redwood. This fact is very seriously impressed upon the settler who endeavors to found a farm where this timber has been "worked" for logs. From the roots of the stumps of chopped trees a perfect mass of young timber sprouts the second season afterwards. To create a second growth, therefore, all that is necessary is to thin out the new growth sufficiently, and prevent fire from injuring it. Evidence that new forests will rapidly take the place of the old may be seen in any portion of the redwood belt where fires have been kept in subjection. We have often thought that should the Government offer as great inducements in the reproduction of redwoods as it is doing to encourage timber culture in parts where it is unnatural for forests to thrive, that the redwoods would never become exterminated, as has so frequently been predicted. One must confess, however, that the matter of cultivating this tree with a view to growing timber like anything of its present size, would require a people possessing a higher regard for generations a hundred or more years hence than the mind of an average American can comprehend

Various estimates have been made of the area of the redwood belt, as well as the amount of lumber it contains, but nothing satisfactory seems to have been ascertained. Dr. Kellogg, in his "Forest Trees of California," says that "probably from a fair estimate of the forests along our coast, it would not comprise much more than about three thousand square miles of timber land"

The Government map in the "Forestry Bulletin" (No. 13) shows that the really valuable portion of the belt (from Russian River to the northern limit) covers about two hundred and seventy miles from north to south. "Now, (says Benner, writing his 'Wonderland') suppose only the lowest estimated breadth to cover the whole distance, there would be 4125 square miles, exclusive of that portion remaining in Santa Cruz county, and all lying south of Russian River. The Government estimate (board measure) of timber standing in this belt in the census year 1880 was 25,825,000,000 feet. This was made up from estimates furnished by a few lumbermen, whose opportunities for making a fair estimate cannot be questioned. But it is also true that many others, including millmen and lumbermen, estimate from 50 to 100 per cent. higher; and taking the estimated area of the belt from Russian River to the Oregon line with the estimate of timber standing, we shall find even their figures largely increased. The 275 miles covered by this portion of the belt multiplied by the least estimated width (15 miles) gives 4125 miles. A square mile contains 640 acres, and the average yield per

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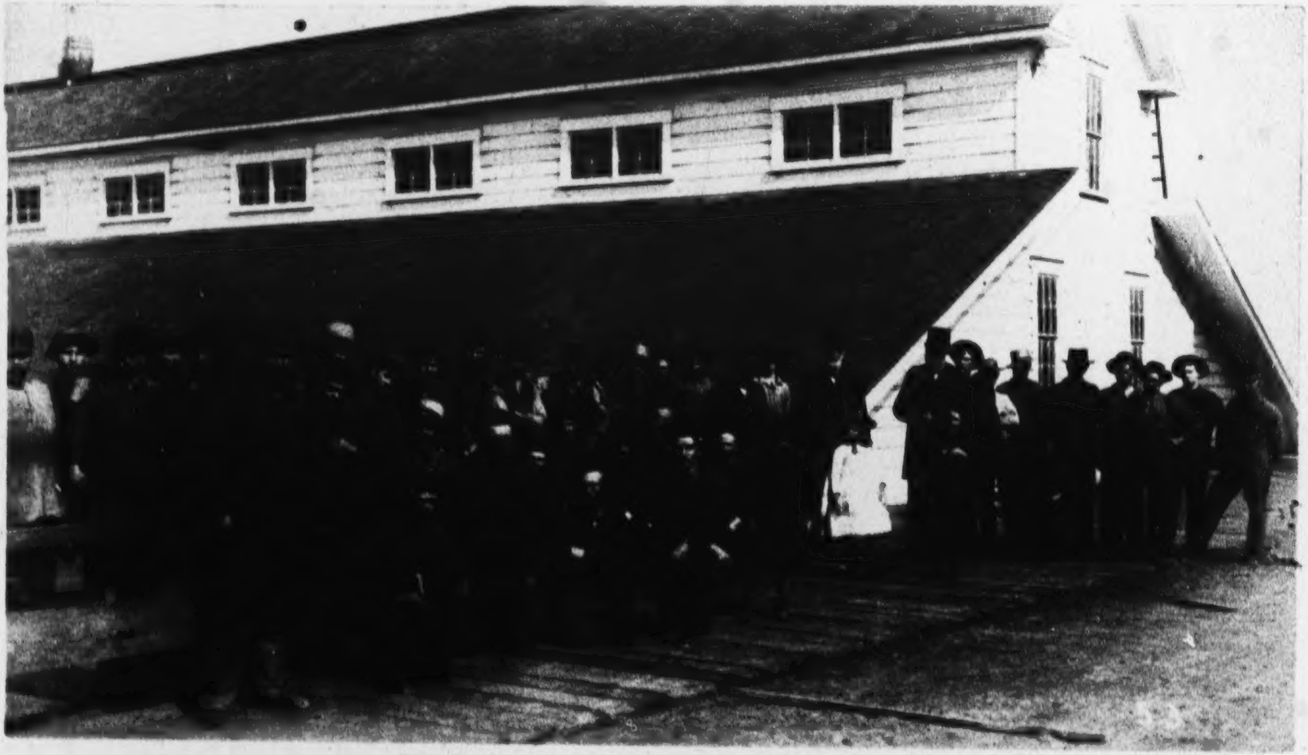
acre (according to Government estimate) is 50,000 feet, which would give 32,000,000 feet to the square mile. This would give as a total for the 4125 square miles 132,000,000,000 feet of standing timber, instead of the published estimate of 25,825,000,000. "It may be that the estimated yield is too great, or that the extent of the belt has been overstated; but it is a matter of common experience that estimates fall short of the actual yield of claims when they are "worked," and there are those who believe "the half has not been told." Practical work demonstrates that estimates of timber standing will scarcely hold good, especially when these estimates are made by strangers to redwood lumbering. Even with the greatest care in preparing beds for trees to fall upon, it is conceded by redwood lumbermen that 20 per cent. of the real measurement is waste through breakage

Some of the notable claims "worked" by redwood lumbermen have yielded by actual scaling 250 M. per acre. The Washington claim near Humboldt Bay is said to have paid its owner by stumpage alone fifty thousand dollars.

James E. Barnard, now Superintendent of the California Redwood Works on Freshwater Creek, which empties into Humboldt Bay (who, by the way, is given credit for being one of the most practical loggers both in pine and redwood on the Pacific Coast), states that he once felled a tree that scaled, after cut into logs, 66,500 feet. With such luck as Barnard had in felling timber, acres of redwoods in different parts of Humboldt and Mendocino would yield two million to the acre. It must be understood in this connection, however, that there are not a great number of professional loggers that understand felling trees, or, for that matter, putting them through to tide-water, like Ed. Barnard. In fact, he is what he has credit for among redwood lumbermen—a boss logger. It may as well be stated here that the process of scaling logs in the redwoods, in order to produce a certain number of feet, after manufacturing, to the millmen, is quite different from the rule by which logs are scaled in the pine woods, especially those in the eastern pine forests. The explanation is this—the size of the redwoods demands the use of circular saws of greater dimensions and corresponding strength. To give both the size and strength—a thicker plate of steel is required, and consequently, a setting of the saw teeth in proportion, making a kerf that destroys or wastes to the millmen at least ⅛ of an inch at every cut of the saw. As the value of redwood becomes better known, however, there is a disposition manifested among the millmen to economize in this particular by sawing into "cants," ranging from 10 to 16 inches with the heavy saw, and then resawing with single saws or ponies, taking out a kerf only of ¼ inch. It is a mooted question whether a band saw can be made to work successfully in sawing large logs into cants.

Economy in the manufacture of redwood lumber is a matter in which the pioneer millmen of the Pacific Coast have taken but little interest until within the past three or four years. This could hardly be expected to have been otherwise, for the reason that the supply seemed to them unlimited and inexhaustible. The interest manifested by foreign investors and eastern capitalists in the timber reserves of America, however, has of late checked the inclination to waste which our old lumbermen inconsiderately indulged in for years. This check upon waste is commendable, more especially in the redwoods, because of its adaptability for building purposes, where white pine and the softer woods of the eastern forests are considered indispensable. And that the redwood is largely to fill the demand which has caused the almost entire destruction of the pineries of Maine, Michigan, Wisconsin, and Canada, there is not the least doubt among observant lumbermen of the eastern States. As corroboration of this statement, we may here refer to the large number of agents sent into the counties of Humboldt and Mendocino during the past two years by eastern capitalists, as well as from England and Scotland, to purchase tracts of redwood timber ranging from three thousand to ten thousand acres. Some three years since the first eastern investors made their appearance on this coast. Through the information imparted by Mr. J. E. Barnard (better known as Ed.), of Eureka, Humboldt County, an agent was detailed to make a report on the accessibility and probable yield per acre of certain lands owned by various parties on the Van Duzen—or north fork of the Eel River—some twenty miles from South Humboldt Bay, and thirty miles from Eureka on the North Bay. The agent's report, endorsing all that Mr. Barnard had stated, brought the principals to the spot. A very few days' examination fully satisfied them that the report, which gave an average of 100,000 feet per acre to a large belt of timber, which could be made accessible at a comparatively low price, was within bounds. Upon their return to the East, a syndicate was formed to purchase, with a view to use in the then unknown future. A dull period in the lumber trade that year was not taken into consideration, fortunately for them; and these redwoods, to the extent they were willing to gamble, were bought, some six thousand acres, at remarkably low figures. This first purchase is now known as Buffalo Syndicate, Number One. Within six months the California Redwood Company was formed, and David Evans, the present Superintendent of this vast lumber concern, was made agent to purchase. The amount of money invested by what is known as the "Scotch Syndicate," has been variously estimated. The properties bought, however, consisting of four large mills, three steam tugs, railroads, work cattle, seventy-five thousand acres of of the best forests, ships, schooners, and other equipments for carrying on an extensive lumber trade, are estimated by the shrewdest local observers to have cost upwards of four millions of dollars. Of this company more is to be said further on. While this purchase was being consummated, another syndicate was formed in Buffalo, known as Number Two, and some five thousand acres were purchased on Yager Creek, a tributary of the Van Duzen. The same season (1882) about seven thousand acres on the main Eel River changed hands, owners and purchasers both residents of this coast. This, known as the "Pacific Lumber Company," was a corporation formed by Ralston in 1868—himself, and the old firm of Wetherbee & McPherson being the principal owners. These large purchases of redwood timber created no little excitement, both among San Francisco and eastern capitalists. The fact is, it was the first time that redwood lumber and timber attracted widespread attention, and its numerous good



Dolbeer & Carson's Mill Crew

qualities were brought prominently to notice. Perhaps the interest manifested by non-residents of California in redwood lumber may be an incentive to our lumbermen to economize in its manufacture. It must be conceded that a great saving of timber can be had through the use of thinner saw plates, that will not use up so much of the log.

Public attention having been called to the special qualities of redwood, as heretofore stated, through purchases of a few large tracts of its timber, agents for eastern lumbermen have visited this coast in large numbers during the past year, with a view to providing for the future needs of the great lumber consumers of the United States. While all agents sent out to report upon the quantity and quality of this essentially California product admit its fitness to fill any gap caused by the gradual and final consumption of the white pine of the East, they are somewhat staggered to find that tracts of timber sufficiently large to warrant the establishing of expensive plants for its manufacture are not so numerous as they had anticipated. An impression seems to have obtained abroad, that the redwood forests are yet open to entry from Government, and that a picayune profit paid to locators under the timber act would secure large tracts at merely nominal figures. While this impression has been shown by investigation to be false, it has, nevertheless, been the means of supplying non-residents of California with very valuable information concerning the superior qualities of redwood for inside finishing purposes, as well as for its lasting qualities in any department of industrial art.

Humboldt and Mendocino Counties have been thoroughly "cruised" by the agents of eastern timber speculators during the past two years, only to find all the accessible locations for lumbering possessed by Californians. And these possessions are distributed largely among the laboring classes, the average to each holder ranging from eighty to three hundred and twenty acres. To consolidate these comparatively small holdings, therefore, is a matter that timber investors of the East, as well as of California, find it difficult to accomplish. Under these circumstances, many agents, reporting the facts, are withdrawn; while the principals express their dissatisfaction at finding the real value of redwood timber lands is not entirely unappreciated by the average Californian. That a consolidation of ownerships in redwood timber lands will become a necessity in many localities, there is no doubt; at least, to such an extent as to warrant the lumber manufacturer in his outlay of capital through the erection of expensive mills, the building of substantial logging railways, and the furnishing of other costly equipments requisite for a complete manufacturing outfit. The cry of monopoly, so far as the ownership of a respectable sized timber tract is concerned, is ridiculous. It may be popular and proper to excoriate monopolies in general, either for political effect or from communistic motives; but it will not force the lumber manufacturer to expend from one hundred to five hundred thousand dollars in erecting mills, etc., upon a circumscribed area of timber land. For the present generation there is apparently no necessity for the consolidation of timber holdings more than those already in that condition. To demonstrate this, it is only necessary to call attention to the fact that the number of mills now in operation, the owners of which, as a rule, own large reserves of timber lands, can easily overstock the lumber market if run two-thirds of the year. Millmen state that the capacity of the mills now in operation is sufficient to cut double the quantity that now finds ready sale. With cheaper transportation to the East, however, either by sail or rail, the present corps of redwood mills would hardly meet the requirements of the trade. Under any circumstances, whether the demand for redwood materially increases or not, the work of consolidating small bodies of forests into tracts sufficiently large to warrant operations will, in the nature of things, gradually go on. It is only a question of price that will prevent all accessible redwood lands from being consolidated into reasonably large tracts within perhaps another year.

Characteristics of Claim Owners.

The price for fair or extremely good redwood lands at accessible points varies according to the disposition of the owner. If he be of a nervous, irritable, and unsettled character, he is just as likely to sell his "claim"—one hundred and sixty acres—for a comparative pittance, should he be approached at the proper time, as he would be to demand a value for stumpage at another time equal to that realized for the lumber from it after passing through the entire process of its manufacture. This is the man who would, in Wall Street or at the mining stock boards in San Francisco, "buy 'em when they are high, and sell 'em when they are low." Take this party when there were booms in locating redwood "claims" in years gone by, and he would figure with his neighbor to a nicety that such a tree, which he would decide was a fair average of those standing upon his "claim," would produce at the mill 15,000 feet of lumber. "Now," he continues, "I have counted thirty and forty trees to the acre in different portions of my claim, but to show that I am setting it low I will say twenty trees to the acre, and here I have 300,000 feet to the acre, or 4,800,000 on my claim. At one dollar stumpage, this 'claim' will clear me $48,000, and I won't take a cent less, though all the lumbering monopolies of California begged upon their knees for it." A dull season in the lumber market possibly following, the boom died out. No one talked of redwood that did not prophesy it would be one or two hundred years before this particular "claim" would be required to meet the demand for lumber, and correspondingly he became depressed in his ideas of redwood values. At this stage of his feelings regarding the value of stumpage, and the possible contingency that the years of his natural life would scarcely be prolonged to the day that his "claim" would be called upon to supply the lumber market, he concludes life is too short at best, and he will close out his redwood holding for three thousand dollars; take the money, buy a small ranch where he can raise chickens, keep a cow and horse, raise cabbages, melons, and other garden truck, and console himself with the idea that he is yet to spend the remainder of his days in comparative comfort. He lies in his cabin bunk and ponders upon his isolated condition. He goes to sleep and dreams over the same subject; wakes up and strikes for the nearest lumber mill, to sell to its propri-

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etor; but is met with a cold reception upon making known his business. He hears there is no good outlook to the lumber market; that the mill is about to shut down; that wages have been reduced for some time: and the picture is generally so black that he even offers to sell below his last estimate of value. In the event the lumberman has had an eye to his especial case, the nervous character is relieved of his holding at a price quite satisfactory to the purchaser. With this character to deal with, the process of consolidating "claims" is not tedious. This class of "claim" owners—whose opinions are as vacillating as the whims of a child, and whose spirits are elevated or depressed as the demand for timber increases or diminishes—has seldom been known to reap any great benefits arising from the ownership of timber lands. Now take the contrary disposition—one of a phlegmatic temperament, one who buys his "claim" to stay with it for a term of years, or until the encroachments of the logger in his direction place an actual stumpage value upon it—and he invariably realizes a snug sum of money. Many cases might be referred to where this class of owners have realized small fortunes, ranging from twenty to fifty thousand dollars, by patiently biding their time, and taking advantage of opportunities. Where one of this character that is a success is found, however, twenty of the first description will be met with. Many instances might also be referred to where even the phlegmatic, obstinate, patient holder and owner of a single "claim" fails to reap a harvest. These have been known to refuse prices for stumpage which were reasonable until the millman removes his mill, perhaps, or logging railway and camps, to some locality where timber is abundant. Here, then, he discovers that he has overreached the mark, and is like an old maid who has refused one offer for her hand better than the last during her youthful period, and finally is left alone in her glory without a bid. This obstinacy does not necessarily cause a total loss of his property by any means; for after the sackcloth and ashes period of his mourning over his too grasping ambition, he settles down to the work of preparing a way to become a lumber merchant in a certain degree on his own responsibility. He thoughtfully canvasses the situation, and says to himself: "On this 160 acres I have twelve million, sixteen million, perhaps twenty million, feet of timber"—board measure.

The old logging roads to the shipping point are still left. The grades and curves could not be removed by the millman when he left the district. The solitary owner has these marks of improvement as a basis to work himself again up the ladder of fortune. At a nominal expense he adds two more horses to the span he has acquired by working for wages in his patient days, and by which, of late years, he probably made a scant living doing odd bits of hauling. With his four-in-hand, a strong wagon, harness to match, and his inherent strong will, he is prepared to do battle against the monster redwoods on his own account. A shake-maker, perhaps, in addition a tie, post, and picket splitter, is engaged to work up the timber, and thereby supply his team with freight. He acts as proprietor, teamster, and commission merchant at one and the same time, and so disposes of his truck to the highest bidder at the nearest railroad station or shipping point on the coast. It may be a slow, plodding way to the realization of his earlier hopes of obtaining the value of his timber all in a "bunch"; it may take the balance of his working days to complete the task, with the addition of teams as profits accrue; but it comes, all the same. The character here described is not an uncommon one, nor is his ultimate prosperity a matter of doubt. The bulldog pertinacity and obstinacy of such a man will win in any country. The patience of such a man is beyond ordinary comprehension, and the peculiar trait exhibited may be compared to virtue, which is said to have its "own reward."

Waste Caused Through Split Lumber.

Referring to the making of shakes, railroad ties, posts, and pickets, in connection with the patient and untiring timber claim owner, the amount or quantity of this material consumed on the Pacific coast, in addition to what is shipped to the interior, is enormous. As a matter of fact, the waste in the production of these crudely prepared necessities in the lumber trade is infinitely larger than that which characterized the operations of millmen in the earlier history of manufacturing sawed lumber. Not only is the sacrifice of our redwood forests great through the working of split-timber men, but the sugar pine of the Sierras suffers equally, especially in the manufacturing of shakes and pickets. The straightest grained and clearest timber alone can be utilized by the split-timber man. He may possibly obtain from a tree that will cut up 150 feet in length of logs for a mill, fifty feet. This is the very best, taken as it is from the butt end. The price obtained for this class of lumber—all things considered—is outrageously low. The value per foot—board measure—is never above, but usually far below, that of sawed stuff of an inferior quality of logs. Were consumers, particularly of posts and ties, to carefully and intelligently investigate the matter, they would find, from an economical standpoint, that the split ties and posts are far in advance of material of the same description sawed at mills. Premising that all now appreciate the better lasting qualities of the butt logs of redwood, it is difficult to understand how it is that split lumber is at a discount in our markets. Only one explanation seems plausible, and that is, that people purchase something to sell as soon as a profit is in sight. To sell, an exterior must be taking to the eye; therefore, no attention is given to lasting qualities. Sawed posts with sawed pickets have a trim, dressy look, to which split timber of the same wood is not to be compared—to the eye. The difference in the matter of pickets would scarcely be noticed in a life-time, for the reason that they do not come in contact with the ground when properly placed in position.

As for railroad ties, practical builders are by this time thoroughly posted as to the superior quality of butt log material for use. While upon the subject of railroad ties, we may state that, with the exception of the yew—and this is not superior—there is no timber on the American continent that surpasses the redwood. This is now admitted on all sides. Were no new roads to be constructed, the consumption for renewals in the future for railways now in operation

FELLED TIMBER.

would make a terrible draft upon our timber reserves. Presuming that experience with redwood ties will obtain for them the preference at all centers where they can be shipped at reasonable figures, the following from the New Orleans "Bulletin" of a recent date is submitted to give an idea of the possible call for them, and the relative demand upon our redwood forests.

"There are now fully 148,000 miles of railroad track in the United States, and therefore about 391,000,000 ties, and the average consumption for renewals should be about 56,000,000, or the product of 560,000 acres of land, at 100 ties per acre, requiring 126,000,000 acres—26,000 square miles, or nearly four times the area of Massachusetts."

The estimate here made upon the number of ties per acre will appear ridiculously small to the habitues of our redwoods. The standard size of ties, six by eight inches, and eight feet long, gives thirty-two feet to each—making three thousand two hundred feet per acre, according to the "Bulletin" authority. A medium-sized redwood tree, say six to seven feet at the butt, and having seven to nine lengths, at least, that split readily, will give a product in ties equal to five thousand feet, and this is a low estimate. It is a poor "claim" that will not have ten trees of this description to the acre, making a total amount of ties there as the product of a single redwood acre 50,000 feet. Compared to the eastern estimate, therefore, one acre of our redwoods would be equal to nearly seventeen acres allowed to timber utilized for that purpose in the East. In different sections of our country, ties for railroads have heretofore been manufactured from timber most convenient to the lines of construction, for the simple reason that railway corporations have been forced to hasten their completion in most instances to secure subsidies that might lapse within a given period. Hence, material for construction, especially ties, was selected without regard to their future worth. It was "Drive her through fast as you can," during the late boom in railroad building on the Northern Pacific, Southern Pacific, Mexican and other roads; and consequently the necessities of the hour allowed material to be used that in repairing would be excluded. Upon what quality of timber for ties the New Orleans "Bulletin" based its estimate, of course, is a matter of conjecture; but a reasonable supposition is that it is much inferior to redwood ties, for these will last for a generation, where no more than ordinary wear and tear is required. Taking, then, into consideration, the destruction of eastern timber from the "Bulletin's" estimate, and all must confess that in the special line of consumption for railroad ties alone, there can be no question that our redwoods will be called upon to supply, before many years, the principal railroads in the southwest and west of the Mississippi. More particularly may we anticipate this when corporate officials have become fully satisfied of its lasting qualities.

SHAKES AND SHINGLES

While both these products of the lumberman in early days came under the head of "split-stuff," they are now to a great extent manufactured by machinery. At any rate, with the latter mode of preparation for the builder, the quality of timber used is the same, as nothing but clear stuff is salable. In fact, the percentage of redwood is so largely clear, there is no particular object in manufacturing from second-class butts or logs. Not only do all first-class redwood mills run shingle in conjunction with lumber mills, but large capital is employed in this line as a specialty. For eastern and foreign shipment, only a small quantity of three-feet boards or shakes are in demand. Mexico, South America and the Sandwich Islands consume many thousands of shakes annually, but the principal market is in the agricultural districts of California, Arizona, and New Mexico. Redwood shingles are growing more and more in favor in foreign markets, as their durability comes to be understood. Since their first introduction in New York and Boston, to which cities they were first shipped by sailing craft around Cape Horn, the demand has increased rapidly, and at this time they rank the highest among builders as the best roof covering to be had. Imitations of slate-stone of every variety of form are now manufactured, and when painted tastefully present an appearance quite as pleasing to the eye as the most expensive slate. In many respects they are superior to slate for roofing purposes, particularly in regard to repairing after a few years' wear and breakage, as experience has demonstrated to householders. With cheaper and quicker transportation facilities, the time is not far distant when redwood shingles, as well as other material manufactured from it, will take precedence in the lumber markets of the world. And this can now be relied upon at an early day, as competing railways across the continent stretch out their arms of steel in every direction, to secure business from which to pay moderate profits upon their largely associated capital. Then, again, we have the promise of ship canals and ship railways across the Isthmus and over Nicaragua. De Lesseps, the renowned French engineer, and head of the syndicate now vigorously pushing operations on the Panama ship canal, affirms that this great highway of transportation between the Pacific and the Atlantic will be completed in 1888, according to statements made at the initiating of the work. Much adverse criticism has appeared in the public press of America during the past year, as to the practicability of this Herculean enterprise. Nothing daunted, De Lesseps continues the work as though the cry of jealous brothers of his profession, or more likely the paid emissaries of opposing parties, desirous of securing the profits of a carrying trade that is beyond computation, were but the combined vociferations of a pack of hungry mosquitoes. To the producers of the Pacific Coast, subject as they now are to the pooling of railroad interests and their monopoly in the carrying trade, nothing more can be desired nor prayed for, with such interests in the future, as the early completion of this splendid enterprise, conceived and inaugurated by De Lesseps. So far as capital is required in carrying forward this magnificent enterprise, there seems to be no end to the supply, when those are appealed to who know De Lesseps best, and who have for years had tangible evidences of his success in the various enterprises coming under his personal supervision.

Cheap and rapid transportation to all parts of the world from the Pacific Coast is, just now, the great desideratum to the complete introduction of our favorite soft wood abroad.

IN THE REDWOODS.

With the higher wages paid by lumbermen in California in all departments of their industrial pursuit, it is not a liliputian task for them to convince eastern consumers that their redwood products are really cheaper for building purposes than white pine, prices of each being equal, according to grade and quality. A certain period of time must necessarily be allowed for those unacquainted with the advantages in the use of redwood over all others, before its appreciated merits will earn for it the reputation accorded to it by consumers and architects in the state of its nativity.

Small shipments of clear redwood lumber to Boston were made in 1880 by the way of Cape Horn. The venture for a time seemed doubtful, but through the exertions of the dealer, builders were induced to try it as an experiment, and a fair profit to the shipper was realized. Other cargoes followed from time to time during that year. The succeeding year, 1882, a contract was made with John Rosenfield, the agent of a line of clippers running between San Francisco and New York and Boston, to transport such quantities as could be accommodated without interfering with more profitable return freight. The result was, that in consequence of the increased demand, there were not a sufficient number of ships to meet requirements. The price of freighting was $16 per M. for lumber, and an approximated amount per M. for shingles. To fill orders with greater dispatch, the Central Pacific Railroad was brought into requisition, and seasoned plank and boards were transported at $20 per M. Through carloads still command the same freight charges. Cargoes from Humboldt Bay, or along the Mendocino coast, purchased at wharf in San Francisco, cost (for clear) from $28 to $30 per M. Taking the higher price, then, as a standard, and adding overland charges, the best of clear redwood is landed in New York and Boston at $50 per M. White pine—first quality, "uppers"—in the same markets, brings $55 per M. So it is seen that there is a growing disposition to substitute in its stead, as a favorite material in its line, our California specialty, the redwood. In ten years time—yes, say six years—or when the Panama Canal will be able to afford cheap transportation, the redwood will, without doubt, be so thoroughly appreciated in the East, and in the European countries the demand for it will be such, as will astonish those who now predict our forests are sufficiently extensive to supply the world with timber for one hundred years.

Logging in The Redwoods.

To parties in the eastern lumbering districts who are unacquainted with the method of felling, sawing, and handling the monster redwoods, the photographic views herein contained will give a clearer idea of operations, as carried on, than fifty pages of explanation in print. The detail work cannot well be represented in a limited space.

Almost the first thought passing in one's mind, as he enters a virgin forest of redwoods, is one of pity that such a wonderful creation of nature should be subject to the greed of man for gold. The same feelings of awe pervade one's being upon his first introduction to this apparently exhaustless army of giants, that impress the beholder of Niagara, Yosemite, and the near relatives of the redwoods—the Big Trees of Calaveras and Merced.

The modern logging camp is similar in appearance to the settlements made fifty years ago in the oak, beech, and maple forests of western New York, Pennsylvania, Ohio, and Illinois. The difference, however, in the objects to be attained by the two classes, is diametrically opposite. While the camp or settlement of the logger is formed for the express purpose of pulling down the forest for the simple value of its timber, the settlements of the early pioneers at the East were intended as the centers of trade in the future, and the producing of values from the soil upon which the forests fed. About the same degree of discomfort characterized the outlook of either settlement in the beginning.

To the temporary visitor in either there is a sensation of romance; to the permanent resident it only suggests hard work, long hours, and debarment from ordinary social life; hence, only those who are accustomed to hard labor find their way thither. These loggers' camps consist, perhaps, of a dozen shanties twelve feet square, in which the men sleep in bunks ranged upon the side opposite the entrance. There is the cook-house fifty or sixty feet in length, and thirty feet in width, wide enough to accommodate the sitting of two tables lengthwise. The stove and utensils for cooking are separated from the eating department by a partition of boards, or cheap cotton cloth tacked upon upright posts. The cook, usually of the sterner sex, is the oracle of the camp, occupying about the same social position as does the Justice of the Peace in a mining district. He is invariably appealed to by his boarders to settle disputes, whether concerning questions of law, love, or labor. Like Jack Bunsby, the cook is supposed to deliver opinions as is opinions. He can rattle away upon the best methods for educating the masses. Gives a slap to believers in any religious faith. Quotes Shakespeare, Byron, Moore, and frequently the Bible. Has a smattering of German, French, Latin and Greek. Calls off at a stag dance, and whistles an accompaniment. Music is one of his weaknesses, and he claims to read it correctly at sight. In fact, he apparently possesses all the accomplishments of a jolly good fellow "about town." It is not an unusual thing, either, to find that he is a graduate of some leading college or educational institution, who has banished himself from the populous town or city to break up convivial habits. In a small way he acts the merchant; buys tobacco and cigars by the box; socks, woolen shirts, jumpers and overalls by the dozen. These, and other little nick-nacks that will hardly pay the logger to walk to the nearest store for, the cook deals them out at a "living profit." Where the "Boss" is not too strict, or his own appetite is not too ravenous to swallow the profits, a thrifty cook generally manages to furnish a very tired or sick man with a glass of whiskey, the bottom of the glass coming up in the center half way to the brim. As a rule, however, liquors are not allowed in camp, unless the "Boss" holds possession of the demijohn.

The store-house is well provided with numerous barrels of corned pork and beef, kits of salt fish, piles of bacon, beans, and all the substanials which go to make pioneer life endurable. Indeed, the logger is more liberally supplied

LOGGING WITH DONKEY ENGINE

with provisions than any other class of workmen. The larder is never short of the best flour, butter, coffee, tea and dried fruits, besides canned goods of every description. Millmen, or logging contractors in the redwoods, are proverbial for their liberality in supplying their crews in camp. Fresh beef by the quarter or half, and sheep by the carcass, are forwarded from supply centers, as often as required to keep the assortment in good form. The cook, being amply supplied with the wherewithal to satisfy the hunger of his crew—and who ever lived in the woods a week that was not ravenous, if healthy?—loads the tables down without stint. If he were to furnish a scant supply of anything, he is reminded of his failing by mutterings not to be misunderstood. His reputation as oracle, he finds at once is in the balance. His theological, historical, musical and political averments seem likely to fall upon ears that will not hear, and he secretly declares that the proprietor's larder shall not lower him in the estimation of the crew.

A scantily supplied table in the logging camp is, therefore, an event beyond the control of the cook, subsequent to his complete initiation into the mysteries of life in the redwoods. Without exaggeration, we may say that very few hotels—making no pretensions to style—either in the larger towns or at summer resorts, set a better table than is found at the logging camps and sawmills of our lumbermen.

To be sure, napkins and finger-bowls cut no figure in our logging cook's department, nor is a formal change of crockery thought indispensable at the end of every course; nor are remarks passed should Bill, or Tom, or Reuben eat baked beans with his knife, or have the audacity to help himself with his own fork. With all due deference to the amenities which characterize social life in ultra-fashionable society, the humanitarian, we venture to assert, can select no spot where he can witness the enjoyment of satisfying the inner man more fully than at the boards of the loggers' camp.

But to return to the further surroundings of the camp, from which we have digressed at so much length.

The repair shop, consisting of a blacksmith's and "Jack at all trades" separate departments, is looked upon as a sort of manufacturing center. Here all the oxen are shod, chains, "dogs," jack screws, picks, shovels, wedges and trucks (if used) are repaired, ax helves fitted, mawls made, saws filed, and tools ground. The blacksmith and handy man find quite sufficient to do keeping things in order, for a gang of workmen numbering fifty, sixty or seventy, according to the amount of logs to be removed during the season, requires their services. Then, here is the long barn in which the oxen are fed, and the hay, corn meal, or ground barley are stored. Down through the center is the feed; on each side are the stalls for the cattle, numbering perhaps forty, perhaps sixty, depending as to number upon the proximity of the "claim" to facilities for transporting logs to the mills. Of late years, the method of hauling logs by railroads of standard gauge, which are extended right into the redwood logging camps, has not made it necessary to require the service of so many ox teams. When logs are to be "run" down creek or river, the number of oxen required is owing to the distance the logging "claim" is located from the dumping ground. With the employment of donkey engines, now generally in use in all redwood logging camps, and which work most advantageous ly in "snaking" these massive logs from deep gulch or steep hill-side to convenient points, where oxen can handle them with ease, the number of teams formerly worked has been largely reduced.

Transporting logs to the landings, either for trucks or railroad, or to the dumps in the larger streams, is over a "skid road" by "snaking." The "skid road" is built of compactly laid, small, round timber, twelve feet in length. The "skids" are cut from young timber, one-third to one-half greater in diameter, and placed six feet apart would come under the head of a Corduroy bridge. The "skids" are barked and smooth, as also are the logs; hence, as the latter have only a bearing on the former at every six feet, the "drag" upon the oxen is comparatively light. To ease the pull still more, a "bucket-man" walks abreast of the log while in motion, and splashes upon the "skids" water from a bucket—usually a five-gallon oil can with an improvised handle. Some loggers use "dope," a mixture of cheap tallow and tar, because of the necessity of its less frequent application to the "skids" to keep them "slippy."

Next to the cook in importance at a logging camp, and perhaps his peer, is the ox-teamster, or, as the loggers will insist in dubbing him, the "bull-puncher." He is usually taciturn in presence of the crew, but no doubt satisfies his ambition as a conversationalist while using his budget of emphatic words, calling upon his team to exercise their draft qualities in "snaking" a big redwood. The "bull-puncher" not only commands great respect among his associates in camp, but the highest wages. His calling is quite as professional in its character as that of the engineer, head sawyer, accountant, or lawyer. His monthly revenue for handling the goad-stick dexterously, assisted by an appealing voice tuned to a high key at times, ranges from $150 to $200, board and bunking accommodations thrown in. In the event of his having a family he lives separate from the crew, and draws rations from the store-house, gratis, while his wife does the cooking.

Among lumbermen the "bull-puncher" is regarded as one having an inborn genius to command the attention and obedience of the unwieldy draft ox. It is a common saying, in lumber districts, that an ox-teamster, like an orator, must be born one, to reach the zenith of the gifted talent. Upon his first arrival in camp, when a team of eight or ten yoke are put in his charge, he looks them over carefully, mentally notes the strength of each particular ox, his disposition as expressed by the eye, and endeavors to pair them with a view to having like traits match in those particulars. Stripes, spots, shade or color of beast are all the same to him, so that they work evenly together. For the well-disposed, obedient animal, he has a pet name. For the savage-eyed, with unruly predilections, he has his christening of a sterner sort. He sees to it that they are well fed morning, noon, and night, and groomed with curry-comb and brush. The extra care of a team makes his working hours longer than others of the crew, so that between his retiring and rising hours he has no leisure to chat with the choppers, chain-tenders, etc., who gather in knots after supper to smoke a logger's invariable companion—the pipe.

LOGGING WITH DONKEY ENGINE Dolbeer & Carsons

Since pioneer days, when emigration to the far West by ox teams was more a question of necessity than choice, the peculiar characteristics of the driver have become as familiar to the reading public as household words. His positive method of expression, the variety of manner in which he unbosoms himself to his dumb servitors, the varied inflection of voice, ranging from the whoop of an Apache to the tender caressing of an infant, and the imitation war dance indulged in at critical periods, have been the theme for narrative writing both in prose and song since the days of '49.

We have seen the Arkansas and Pike County bull driver, with his "whoope" (whip) thirty feet long, marching up and down his team of fifteen yoke of oxen attached to a two-ton load; wearing out both his buckskin lash and his leather lungs in the endeavor to make a speed of ten miles per day. Painting the sky red with the most blasphemous expressions that could be translated from the vocabularies of all the Demons in Hades, his energies seem to be a waste of life, as compared to the "bull-puncher" in the logging camps. Here, every pound that a team of ten or twelve yoke can pull is got out of it by the knight of the "goad-stick," the latter a slim hickory rod, perhaps five feet long, with a steel brad projecting one-fourth of an inch from the small end. One single touch of this terrible persuader upon an ox's haunch is a reminder of unfaithfulness not soon forgotten.

Starting a log from its bed, when every yoke in the team must buckle to the work, is the time the science of our character of the "bull-puncher" is brought to the highest plane of perfection. The chainmen having secured the hooks and dogs, the team is slowly straightened out, till the line of steel couplings from front to rear are tightened to a perceptible strain. Presently our man from Maine or Brunswick, with the goad-stick elevated to about his chin (something after the style of an operatic impressario in his introductory), speaks in low tones to the near leader, "Come, Star," to the off leader, "You, Nig," and so on down the line to the wheelers, calling each by name. At a little brisker gait, with voice increased, he walks back up the line, tapping with his rod first this one then that, and setting their necks squarely into the bows. Now, in distinct and commanding voice, one that the brute has learned to obey, he calls upon "Star" and "Nig," "Duke," "Line," and so on, from one end of the team to the other. Perhaps it is a hard pull. He calls upon his pets in tones that reverberate through the forest, and startle the squirrel in the tree top. His body, arms and legs all seem to participate in the struggle. He drops upon his knees in his apparent excitement, as though every muscle was strained to its greatest tension. The animals have sufficient intelligence from past experience to know that their master is growing desperate in his efforts to move the weight. Their sympathies extend to him, his to them, and every ounce of power is brought into requisition. The effort is a success, and the log once under way is soon on the "skid road," slipping along easily, with the aid of frequent applications of lubricants at hand by the bucket-man, to the landing or dumps. With the exception of excitement exhibited by our hero of the goad-stick upon an occasion here described, his voice is modulated to an ordinary conversatianal measure, while he cheerily speaks words of commendation to his dumb companions.

Referring to the starting of logs from their beds, we may as well state here that the more modern method of removing the massive redwood is by steam donkeys. A simple though strong attachment to the ordinary donkey boiler and engine, known as a "gipsy," and upon which a patent has been issued to John Dolbeer, Esq., of Dolbeer & Carson, Humboldt lumbermen, is now generally adopted by redwood loggers in removing logs from localities difficult to reach by ox teams. In fact, the improvement has caused a decided reduction of teams formerly in use in the logging camps. By making fast the "donkey" to a stump, logs are "started" from their beds, be they ever so inaccessible of approach by a logging team. In the large logging operations of the California Redwood Company, John Vance, Dolbeer & Carson, Korbell & Co., Minor & Kirk, Falk & Hawley, and other lumbermen of Humboldt County, as well as Henry Wetherbee, Tichenor & Co., Heywood & Harmon, and L. E. White, lumbermen of Mendocino County, this valuable adjunct is in constant use.

The donkey is built upon a frame, having shoes like a sled runner. It can be moved from one place to another in the timber by its own power, simply by running a rope from it to a tree or stump, and starting up the engine. The power is sufficient to break a five-inch manila rope. Experience shows it will do more work than a ten-ox team, at much less expense. By the use of snatch blocks, logs are hauled in any direction. This invention was patented in April, 1882.

Returning to our descriptive inventory of the logging crew from which we have at some length digressed in order to illustrate some of the special traits of the ox-teamster, we find the choppers and sawyers numbering from five to eight, according to the amount of logs to be got out during the season. As a rule, the chopper goes into camp two or three months in advance of the others, say as early as January. In many districts they work all the winter months, or what few days there are, while the balance of the crew have gone to their homes or nearest settlement to pass the rainy season. Many use axes having two blades, the helve being straight. The advantage of this ax is, that when ground in the morning, the chopper is sure of a keen edge all day, without returning to camp to use the grindstone in the event of one edge being disqualified for use by accident.

Within the past few years the felling of redwood trees has been accomplished largely by the aid of saw and ax together. This method, though at first appearing to be done at a disadvantage to the workman, is now generally adopted in felling the large redwoods. When it is to be decided where the tree is to be felled, a kerf is made by an ax on the side it is intended it should fall, about one third of its diameter. Then on the opposite side, and nearly as high as the top of the ax kerf, the saw kerf is begun. To facilitate starting a saw properly, two holes are bored horizontally into the tree, about two inches deep; wooden pins are then driven in, on which the saw rests until the kerf is sufficiently deep to steady it. Broad and thin iron wedges are then driven in after the saw into the kerf; this prevents the saw from pinching. Saws for this purpose are from eight to twelve feet in length, having ears at each end, secured by bolts, which can be removed at pleasure. Should it be found that wedges can-

LOGGING WITH DONKEY ENGINE.

not be knocked out, one of the saw ears is removed and the saw drawn when necessary. The wedges follow the saw until the wood, dividing the saw kerf from the previously-made ax kerf, is narrowed to a width where the wedges force the tree, with all of its immense size and weight, to lean in the direction it is intended to have it fall. The expert chopper, in his line, is quite as important a personage in the camp, especially to proprietors or contractors, as the "bull puncher." Still, his wages are less. A good one scarcely ever receives over $125 per month—many less—depending upon their experience and ability to save timber from breaking, when felled. An A 1 chopper drives a stake in the ground, from 100 to 150 feet from the base of his tree; directs the swampers, or helpers, to prepare a level bed in direct line from base to stake. Then with a frame work of narrow straight strips, formed like an obtuse triangle, the base following the ax kerf so that the point of obtuse angle shall be exactly in the line with the stake, he completes the work necessary to "land" his tree where he wishes it, and, perhaps, close by the side of a monster already down. To such a degree of exactness does an expert chopper arrive, that he seldom fails to drive the stake he has aimed at.

The employment of first-class choppers is a matter of great solicitude by the Boss. A mistake in the felling of a single tree, whereby it is broken, takes away the profit of the lumbermen to the amount of the chopper's wages for a month. Especially does it require skill in felling trees in the redwoods, where they are so numerous that the standing timber—as is the case in most places—would more than cover the ground solidly if it were attempted to make a clean cutting at one time. In the heavily timbered districts at Trinidad, on Little, Mad, Elk, Van Duzen, and Eel rivers, as well as on the creeks of Freshwater, Jacoby, Salomon, and Strong's, in Humboldt County, an attempt to remove the standing timber at one cutting would result in a loss of timber to owners that would appear ridiculously great to the lumbermen of Michigan, Wisconsin, and Canada. Three times cutting over the same ground is not unusual in Humboldt and Mendocino Counties, where the redwood grows in its greatest luxuriance. It will be seen, therefore, that much depends upon the good judgment of choppers in the operations of a redwood lumberman.

Following close upon the choppers' destruction of the forests,. come the "peelers." With an ax they cut through the thick bark at distances apart that, in their judgment, will make logs most easily handled in transporting them to mills. Then, with long steel bars, flattened at one end, they jointly drive them through the bark, and alternately pry the thick covering from the tree, leaving a clear field for the next in order in camp—the man with the cross-cut saw. "Peelers" command wages all the way from $50 to $60 per month and board.

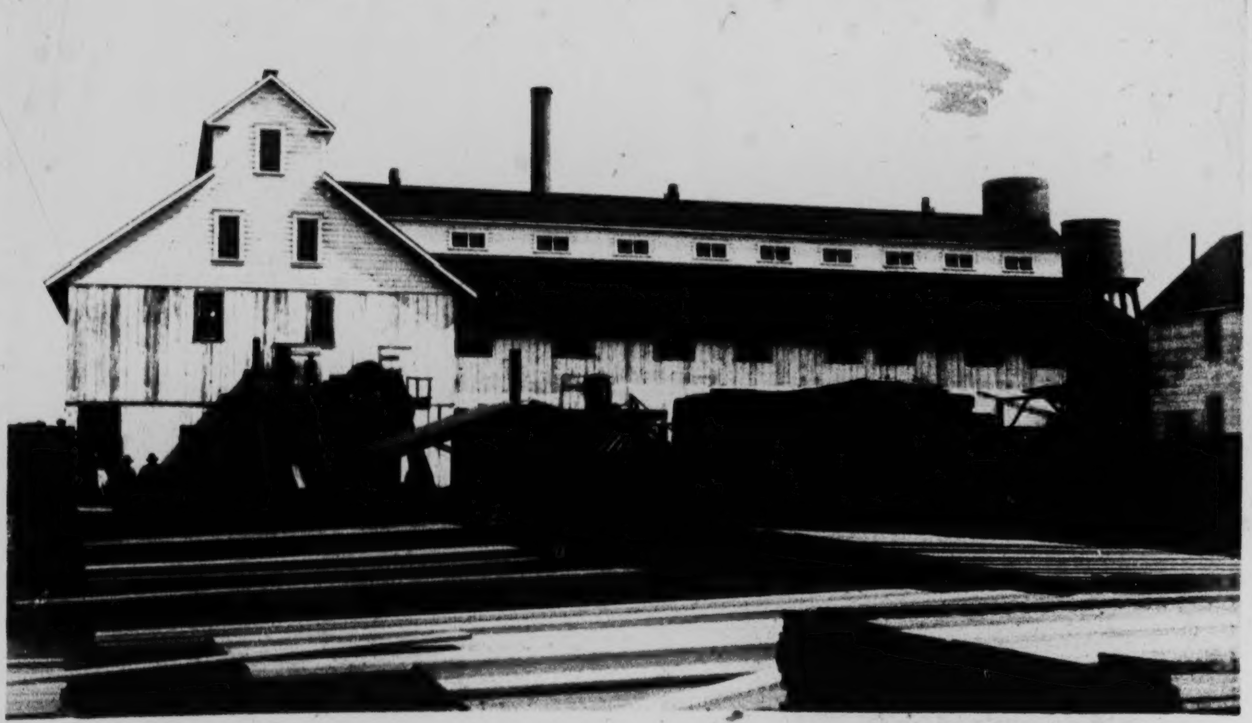
The man with the cross-cut saw must also be of sound judgment. It may be that at some point where the "peeler" has marked a log to be sawed there is a hollow spot in the ground beneath, or the tree rests upon two windfalls, leaving an open gap between. The ends of the log that is to be cut must be propped and wedged tightly, before he ventures to cut the tree in twain. This securely done, his cross cut is brought into play, and it is only a matter of patience and muscle, when the logs are ready for the "swampers." Cross-cut saws for this purpose range from six to eight feet in length, one man doing the work. The latter cuts the underbrush, if any there be, piles the bark upon it in heaps, and sets fire to the mass. His work is laborious, and exacts his closest attention, while his fires continue to burn over an area containing, perhaps, ten acres. It may be the wind blows hard, and a valuable log gets fired. It is his business to see that no waste of timber occurs in his department of labor. He calls to his assistance the water packer, who, with horse or mule, is an indispensable contingent of the redwood logger. The latter lords it over an animal that packs water in canvass fastened on his back to a wooden frame, which looks like an old-fashioned pair of saddle-bags, only on a larger scale. From thirty to forty gallons of water are carried by the animal at a time. The swamper being furnished with water, he soon checks the fire which is destroying the fallen timber.

From two to six animals, attended by laborers, are kept constantly at work on a single logging claim, filling barrels along the skid roads and snaking trails, and for other general uses. One man generally manages two animals.

The trees now felled, cut into desired lengths, stripped of bark, and the underbrush burnt, are ready for the "donkeys" to start from their beds, and hauled to landings by the teams, as heretofore described.

To complete the crew of a loggers' camp there are the engineer at the donkey, the block-shifters, gypsy tender, and the chain tenders. The engineer also fills the position of stoker, picks up broken limbs, and finds no difficulty in securing a good supply of dry material all around and about him. The chain tender fills a position requiring keen perception and constant watchfulness. The dogs, or hooks, made of steel one and a half or two inches square, pointed at one end, with an eye and ring at the other end to which chains can be attached, he drives into the log at points required for utilizing power to the greatest advantage. He nods for the engineer to go ahead. The log must move, something must break, or the dogs must slip. To guard against accident, he has moved out of the line of strain between the log and donkey. Carelessness in this particular has caused the death of several chain men within the past few years. The velocity of a broken chain has a rebound that can only be equalled by the speed of a cannon ball. The slipping of a dog is equally dangerous to life, when in its range.

The block shifter is also liable to accident. The block, or pulley, which he attends is in almost continual use. Perhaps the log is to be started at right angles from the direct line between it and the donkey. A huge stump or broken windfall in the way may require the log to be moved to the left or to the right, that it may be more accessible to the ox-team. The tender secures his block most advantageously for the purpose. The heavy rope that works upon the gypsy of the donkey, and is attached to the log chain which moves through his block, may also separate. In such an event he needs to be out of the line of rebound. His work is compar-



Dolbeer & Carson's Saw Mill.

atively light, yet his duties require the practice of great vigilance. Block tenders receive from thirty to forty dollars per month and board; chainmen, a slight advance upon those prices. The gypsy tender takes in and pays out the rope. He is stationed at the donkey, and acts as an assistant to the engineer in gathering fuel, etc., while the donkey may be temporarily idle, awaiting the movements of the chainmen and block tender in the distance.

Having thus described the different personages that go to make up the redwood loggers' camp, a few words concerning their habits and the manner in which they spend the few leisure hours allotted to them may be interesting. The Sabbath is in every sense a holiday. When their camps are located within five or ten miles of a settlement, or town, having a postoffice, stores, and saloons, a number invariably form a syndicate to make the trip together. It may be that a shake, shingle, post or tie maker in the timber near by, or a settler, who is trying to convert the ground in the rear into a sheep or a cattle ranch, has anticipated the loggers' wants, and provided a large express wagon, with springs, to meet the demand for transportation. The camp is canvassed on Saturday night, and a sufficient number agree to occupy the seating capacity of the vehicle improvised for such occasions. Where several camps are being operated within a radius of four or five miles, as they are, for instance, on Mad River, Freshwater, Jacoby and Salmon Creeks, Elk River, and other places in Humboldt, as well as in Mendocino County, on the rivers and creeks that empty into the ocean, stages are run regularly for the loggers' accommodation. Many of the men, however, prefer to rest of a Sunday in camp, reading the weekly journals or magazines, writing letters to relatives in the East, mending clothes, and, perhaps, doing their own washing.

During the working days of the week there is no desire to spend the evening in any sort of amusement. They are only too glad to occupy their bunks after supper and a smoke. Tired out with hard labor, the nights seem short at best, as the horn toots promptly at six in the morning for breakfast. Thus it is seen the life of a logger is not an exciting one, yet healthful to those who escape accidents, for these are not infrequent where the best of judgment is not displayed and watchfulness is lax in the workmen.

We should, perhaps, have previously stated that the largest logs, say those above ten feet in diameter, are split in twain. The very largest, say sixteen or eighteen feet in diameter, are quartered by blasting. For this purpose, a very long augur is used. A hole is bored past the center, a cartridge inserted, and the log split into sections that can be easily handled either in camp, at railroad landing, in raft, or at mill.

Now that we have taken a glimpse at the preliminary work of turning the redwood tree into lumber—though not so much in detail as some practical observers may think complete—we will follow its segregated body to the mill.

Taking the latest plan adopted for transporting logs to mill by rail, or by rail and rafting together, from logging camps, as a base line for a superficial observation, we find the landing at the end of the skid-road, where the ox-teamster has deposited his freight. This landing is built of fir or pine, which is interspersed throughout the greater portion of the red-wood belt, and seldom manufactured into lumber ; especially the former. The smaller redwoods are also utilized for this purpose, for a redwood that will not measure three feet in diameter is scarcely ever touched by the logger of Humboldt and Mendocino Counties. The landing is built in the form of a buttress, facing the railroad track. Timbers used for the purpose range from sixteen to twenty inches in diameter. Trees in the rough, fifty or sixty feet long, are hauled to the spot, either by "donkey" or ox-team, and firmly framed in abutment form. The upper, or surface, timbers are hewn and leveled to correspond with the car-bunks, upon which the logs are rolled or slid by the "donkey," or by the gypsy attachment, to the railway locomotive. The gypsy attachment to the locomotive is another and late invention of John Dolbeer, Esq., of the firm of Dolbeer & Carson ; and like the "donkey," for its uses, the gypsy locomotive is now in use wherever large logs are to be handled by rail.

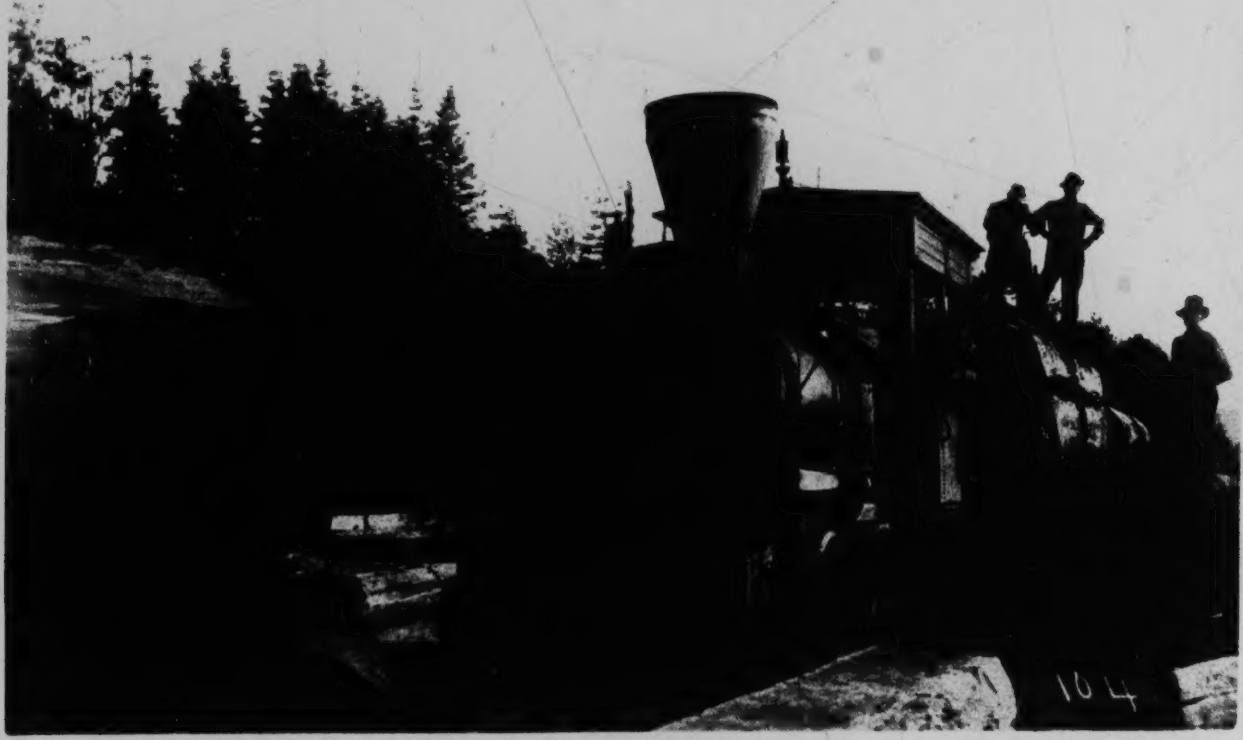
The ease and rapidity by which a train of logging cars can be handled is marvellous, when these modern inventions are brought into requisition. With their use, the strain upon man and beast, as experienced by the old methods of loading logs, has passed away.

The landing always has a supply on hand for the train, which comes whistling through the timber, giving a life that relieves one of the monotony of sound that is heard in camp —the hack, hack, hack of the chopper, the steady grating of the log saw, the twitter of the "donkey," and the occasional apostrophe of the bull-puncher to his mild-eyed brutes. The train hands, usually four in number, who serve in the capacity of brakemen and general utility men (excluding the engineer), under the supervision of the boss logger in camp, consume time to the extent of perhaps half an hour, loading the cars with fifty or sixty thousand feet of logs. As high as one hundred thousand feet have been hauled by a single train at one time on the Freshwater. The minimum of a train load is fifty thousand feet—log measure.

The railroad of standard gauge is necessarily built in the most substantial manner, to carry the heavy weights imposed in transporting these monster legs. The wooden railroad, or tramway, is used in many places for transporting the logs to the streams or to the mills, but as the more accessible timber is being cut off, these are being supplanted by iron and steel rails and locomotives. The logging trucks are made at the different lumbermen's shops, usually located at "the round house" or turn-table building on the road.

The truck wheels and axles alone are bought in San Francisco, and transported to their destination by sailing craft. The beds and bunks are made of pine grown on the higher lands in the redwood belt, and which, it is claimed, is superior for this purpose, as well as for ship timbers. to the Oregon pine or fir.

Old ideas of supplying mills on large streams, or at tide-water, with logs, have virtually passed away, and given place to new ones more in harmony with the spirit and enterprise of the times. Formerly the streams running into the redwoods were depended upon to afford the facilities for transporting logs to the sawmills. For this reason, logging



DOLBEER'S PATENT LOGGING LOCOMOTIVE

was carried on only along the streams or rivers emptying into Humboldt Bay, or along the Mendocino County coast. At that time only the timber along these streams was of any particular value. This method had the advantage of being cheap, and is still in vogue in places where the water-way is particularly advantageous, or where lumbering is done in a small way and on small capital. But it is not equal to present demands, and has, as a rule, given way to the new system of carriage by rail.

As an improvement upon the streams first came the tramways; but they were built as auxiliaries, rather than improvements upon the streams. They also made available certain portions of timber which could not be reached by the old time water process. The old methods have generally been abandoned, and the steel rail and ponderous locomotive are now at the fore among redwood lumbermen who operate extensively.

The California Redwood Company operate more largely with railroads in the transporting of logs to mills, or tidewater adjacent, than any other lumber company of the Pacific coast; in fact, more than any other lumber company in the United States. At their mills at Trinidad, Humboldt County, some fifteen miles of rail are in constant use. On Freshwater Creek the length of the main and branch tracks is probably twenty-five miles. On Elk River a railroad is nearing completion (in which Dolbeer & Carson are also interested) ten miles long. The two last named roads supply mills at Humboldt Bay. The railroad of John Vance, running from Mad River to the same bay, is fifteen miles long, besides branch tracks in the timber.

Korbell Brotners & Company's road, operating for the Humboldt Lumber Company (in the latter of which they are large share-holders), and for Minor & Kirk, and Chandler & Henderson, the first two companies' mills being located on the north fork of Mad River, is about twenty miles long, including branches.

Both the Vance and Korbell railroads cross Mad River, and have bridges which have added materially to the expense of construction. On Ryan's Slough, Jansen & Co. have five miles of railroad. In Mendocino County, L. E. White, at Whitesboro, has twelve miles of road. At Gualala, the Mill Company has fourteen miles, and on the Albion, Henry Wetherbee operates six miles of railroad. All of these lumbermen extend their roads from year to year, as necessities demand.

A train carrying logs or lumber, as the case may be, travels at a speed of about fifteen miles an hour. The Eel River and Eureka Railroad, terminating at Humboldt Bay, built the past summer, will, in the near future, transport lumber manufactured on the Eel and Van Duzen Rivers, and their tributaries. Mills operating upon these streams must, from the very nature of things, build branch roads for logging, as the timber has an immense growth, and cannot be handled economically by any other method.

Bonner, in his "Wonder-Land," referring to the transporting of redwood logs to the mills on Humboldt Bay, says: "Having seen one of these dumps, or landings, towards the close of the cutting season, with its countless number of huge logs, in all of which scarcely a limb or knot is visible;

and remembering that all along the forest line where lumbering is being carried on the same work is being done, one is inclined to doubt the wisdom of such an apparent wholesale destruction of the forest. But let us follow these logs, or at least a raft or train-load of them, to their destination at the mills.

"Whether the logs are 'run' or carried by rail, the object is the same—to get them to some tide-water point where they will be available at all times for use of the mills. Some deep slough or arm of the bay is usually chosen as a railroad terminus. Here a landing is built of heavy logs, with an incline toward the water, the inner line of the landing close to the track. Over this landing, with the aid of jack-screws—without which it would hardly be possible to handle them—the logs are rolled into the water, where they are made up into rafts from time to time, and towed to the various mills, where they are stored in the booms for use. From these booms or ponds the logs are hauled up an incline into the mill by a great chain attached to a low iron car, which is first lowered into the water and the log floated upon it and made fast. The sawyer being ready for the log, he lifts or rolls it to its place upon the carriage by means of a huge derrick; the log is secured, the lever is thrown over, and the log moves up against the double (or triple) circulars, which cleave their way through the wood as if it offered no resistance.

"Where mills are operating back from tide-water, and which are located upon streams, the logs are stored in ponds built especially for the purpose. Here the logging trains which run into the camps dump their freight. From the ponds these mills are supplied by the same process as are the tide-water mills, and the lumber manufactured hauled to shipping points by trains especially fitted up for the purpose."

The process of manufacturing lumber from redwood logs is not materially different from that of lumber mills everywhere, the distinguishing feature being the immense proportions of all the machinery used. Most of the logs coming from redwood forests cannot be handled by saws and machinery of ordinary dimensions. Everything in and about the mills—the mill itself—must be of the same giant proportions as the logs that are brought to them.

Bonner tells a story of the proposal of a Pittsburg (Penn.) firm to fit up a mill in Humboldt County as follows: "The firm stated that it was their special business to fit up sawmills, and forwarded cuts and dimensions of the various machines they were prepared to furnish. The millman informed the Pittsburghers that he was not planning a match factory, and sent dimensions of what the mill would require. This seemed to be a puzzle to the eastern builders, and presently one of the firm came out here as a sort of investigating committee. He soon discovered that their heaviest machinery must at least be doubled in strength and capacity, to be of any service in the manufacture of redwood lumber. The investigation resulted in new patterns, and machinery has since been built especially for this trade."

To complete our rather meager description of Lumbering in the Redwoods, the only interesting feature worthy of special mention particularly, to eastern lumbermen, is the operation

LOGGING WITH DONKEY ENGINE Dolbeer & Carson's

of the triple circulars or better known as "Evans' Third Saw." The invention, as before stated, is one of David Evans, a resident of Eureka, Humboldt County, and the Superintendent of the extensive properties owned by the California Redwood Company.

The mechanical genius, the perfect knowledge of the requirements of a redwood sawmill and a complete mastery of all details in the production of lumber, from the felling of a tree to its landing upon the wharf ready for shipment to any part of the world, have essentially fitted "Dave" Evans to manage with prudence the vast properties now in his charge.

In order to give place to an article written by George D. Gray for the "North-Western Lumberman" (Chicago), and subsequently appearing in the "San Francisco Journal of Commerce" dated August 23d, 1883, we prefer to leave a description of the "Evans' Third Saw" to him. Mr. Gray has been connected with the firm of Dolbeer & Carson for some fifteen years, and writes intelligently upon the subject under consideration. Since Mr. Gray's article was written, a number of new sawmills have been built in the redwood belt. The gypsy invention, as applied to railroad locomotives for the loading and unloading of logs, is of more recent date, hence its omission. As to the uses for which redwood may be utilized, he evidently speaks from practical experience. He says:

"Redwood (*sequoia sempervirens*) is peculiarly a California production, being found nowhere except on a small portion of the coast of this State. The whole belt is confined between the 37th and 42d parallels north latitude, or between Monterey Bay on the south, and Crescent City on the north, an extent of country about 400 miles long. The width is irregular, following the conformation of the mountains, but will average about 30 miles. Below Monterey Bay there is but little timber of any kind, while at the northern extremity of the belt the redwood gradually disappears, and pine, fir and spruce take its place.

"The whole belt of redwood lies upon the western slope of the Coast Range. Throughout the section named the rains are heavy in winter, and the fogs dense in summer, coming in from the ocean with the wind very regularly every afternoon, and during the whole year the climate is mild and even in temperature. Not that I would imply that the section named is one vast forest. These were the original boundaries of the redwood belt. In Santa Cruz county there is considerable standing timber, but north of there until you reach the Russian River, the country has been stripped. Between the mouth of Russian River and Crescent City the country is by no means one vast forest. There are large tracts of fine farming land, extensive sheep and cattle ranges, as well as large sections that have been denuded of their native forests.

"A careful estimate of standing redwood places the amount at about 26,000,000,000 feet; certainly not a large supply, when it is considered that the present yearly consumption is not far from 200,000,000 feet, and the demand each year is increasing.

"The size of the redwood tree varies greatly with the locality. In the southern part of the timber belt, where the rains and fogs are lighter, the timber will not average more than two or three feet in diameter, and the lumber manufactured is generally hard and flinty; but farther north the trees increase in size, the character of the wood changes, until in Humboldt County is found, probably, the finest belt of timber in the world; trees twelve to eighteen feet in diameter, and from one hundred and fifty to two hundred and fifty feet high being no rare occurrence. In this section there are large tracts that have been estimated to have 250,000 feet to the acre, and single acres could be selected that would double or treble that amount, and the lumber is of the finest, softest quality, equal to the best eastern white pine. I speak of these large trees, but would not give the idea that that is the prevailing size. While such trees are not rare, the average size of saw logs is from six to eight feet in diameter, and the most of the mills on Humboldt Bay are built with reference to handling logs of that size. Throughout the redwood belt there is but little other timber. Some little pine, fir and spruce is cut, but no great amount of either.

"As but few of your readers are familiar with redwood lumber, it may not be out of place to give here some of its characteristics and qualities that make it one of the most valuable of the forest productions. As the name indicates, it is of a dark reddish color. It is soft, coarse grained, and very brittle. The grain usually runs very straight, and it splits readily, it being no difficult matter to split out a board one inch thick, eight to ten inches wide, and ten to fifteen feet long. When dry, it is much lighter than pine, spruce or fir, but of the logs cut from a newly fallen tree, the butt log thrown into water will often go to the bottom like a stone, while the top logs will float like cork. It is of slow growth. Of timber now being cut, the circles indicate that many of the trees have been standing thousands of years. The bark of the tree is very thick, soft and fibrous in character, and contains no resin or pitch; hence fires that frequently run through the underbrush of redwood forests have no effect on the standing timber.

"Perhaps I can better illustrate some of the peculiar qualities of redwood, by mentioning some of the uses for which it is peculiarly adapted. Its durability above and under ground causes it to be well adapted for railroad ties and posts. These were formerly split, and that readily, to any dimensions required; but on account of the waste of timber, sawed ties are now coming more into use. Shingles and shakes for roof covering are all made from redwood. When a man has covered his house with redwood shingles, he considers that matter settled for life. For railroad ties and fence posts there was consumed in the year 1881 not far from 60,000,000 feet, and for shingles and shakes about 12.000.000 feet, board measure.

"For tannery tanks it is peculiarly adapted, as the wood resists the action of the tanning solution. A tannery in this city has been using the same tanks for ten years, and they are apparently as good as ever they were. Our wine merchants now use redwood vats entirely, because a certain insect found in the new juice of the grape, which destroys the pine vat by boring through them, dislikes the taste of redwood, and lets it alone. As redwood much resembles

Dolbeer & Carson's - Logging Team at Milford.

Spanish cedar in color, and imparts no odor to affect the taste of tobacco, it is now being shipped quite extensively to New York, to be used in the manufacture of cigar boxes.

"But the principal use to which redwood lumber is put on this coast is the outside and the inside finish of houses, as from 40 to 50 per cent. of the lumber sawed is perfectly clear, without knot or blemish, and much of this can be cut into planks six inches and under thick, and from 24 to 60 inches wide. It is well adapted for brackets, ornaments and moldings of all kinds. While much of the grain runs straight, curly redwood can be selected, which, when polished and varnished, rivals rosewood in its beauty.

"To the extensive use of redwood in our buildings is due, in a large measure, our immunity from large fires in San Francisco and neighboring cities. There being little or no resin in the wood, a fire is easily put out, and when once extinguished it is with difficulty ignited. Of course the general modes, plans and apparatus in use in different lumber sections are the same the world over, but in handling the large redwood logs the nature of the wood and size of the timber call for certain appliances peculiarly adapted thereto.

"Most of the timber is now felled with saws instead of axes, as hitherto, it being found that the tree jumps better from the stump, and causes less waste by breakage, than when the ax is used. The trees are then barked, and a fire run over the ground to burn up the bark and rubbish. Green redwood burns with such difficulty that the good logs are rarely affected by the fire. And now, when all that will burn has been consumed, begins the real labor of getting out the logs. For handling these monsters no ordinary road will answer. It must be wide and smooth as a turnpike, all rocks and roots must be carefully removed, all hollows and gullies filled up; if the road is level or soft, skids must be laid down. If the logs are small, of course such care need not be taken, but for large timber it requires good engineering and much hard work, even, to build a good logging road.

"With the road built, comes the labor of rolling the logs into it. Cattle alone would be useless, except for the smaller logs. Blocks and tackle, often double and sometimes triple blocks, are needed to roll them out of their beds. Nor will any ordinary teamster answer to handle the cattle. He must be a man of judgment and skill. The best teamsters command a salary of $150 to $180 per month. The 'bull-whacker' is usually the highest priced man in camp.

"Once in the road, several logs are fastened together to make a 'train,' and are hauled to a landing to be loaded on the cars, or to the stream to be floated to the mill. The train of logs once started, there must be no stopping if it can be avoided. All along the road are stationed barrels of water. As the train moves, a man runs along beside it, and, filling and refilling his pail from the barrels, throws water in front of the train, that there may be as little friction as possible. The loads hauled are sometimes enormous. One train of seven logs, hauled on Humboldt Bay, in 1878, by A. A. Marks, teamster, with five yoke of oxen, scaled, collectively, 22,500 feet, board measure, of merchantable lumber. No wagons are used in the woods; the logs are simply 'snaked' on the ground.

"Until within the last year, all this labor of handling logs in the woods has been done with cattle, but now they are in many places using steam for the purpose. The machine used is 'Dolbeer's Patent Steam Logging Machine.' It consists of an upright boiler and engine, somewhat similar to a portable hoisting engine, except that instead of a reel to wind the rope on, it has two 'gypsy heads,' one on each end of the reel shaft. It sits on a strong frame, the sides of which are like sled runners. It has a strong purchase from the engine to the 'gypsy' shaft. To move the machine around in the woods, they run a line ahead, make it fast to a tree or stump, take two or three turns around the 'gypsy,' and start up the engine. In this way it hauls itself wherever wanted. When the machine is in place, it is made fast to a tree or stump, and a line run to the log to be removed, and by means of snatch-blocks the log is hauled in any direction desired. By use of this machine heavy logs are brought out of ravines and bad places, where it would be almost impossible to get them with oxen or horses.

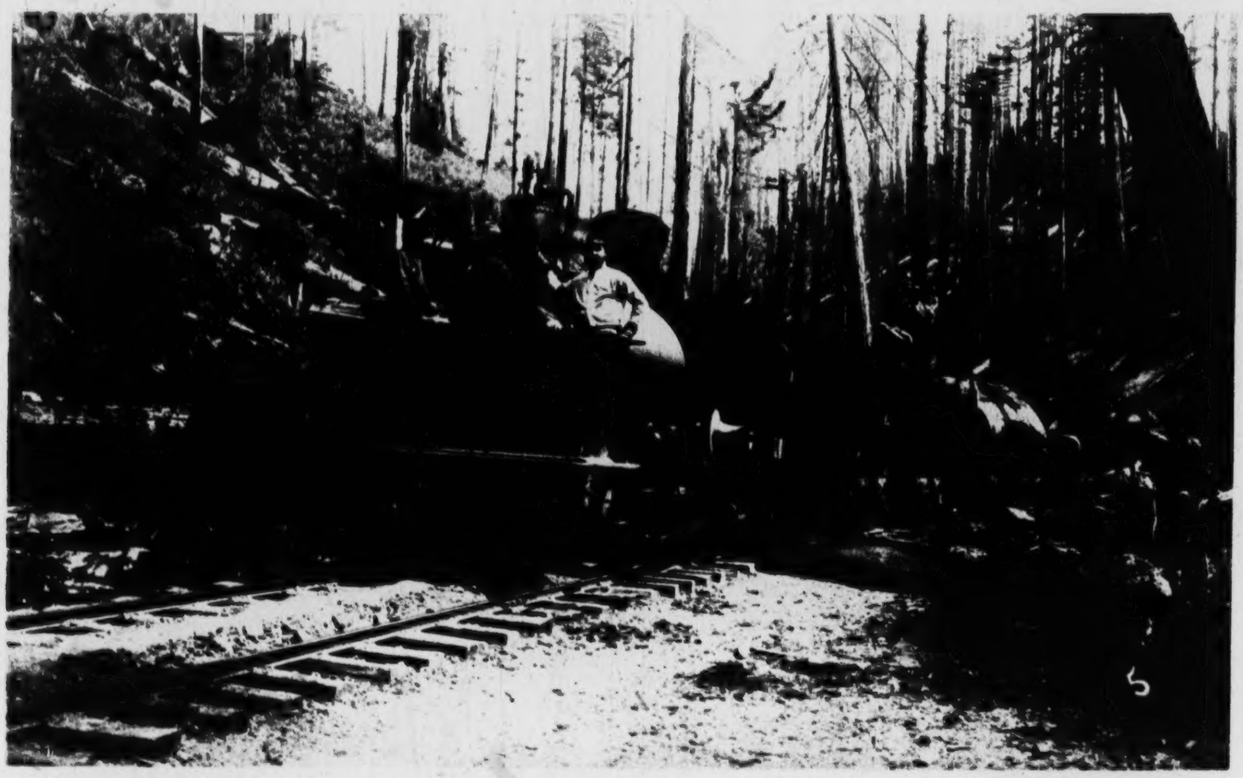
"Our redwood mills are generally up to the times. All the modern improvements of double circulars, gang saws, pony saws, gang edgers and trimmers are in use. While double circulars are used in nearly all the redwood mills, many mills on Humboldt Bay are using, besides, what is called 'Evans' Third Saw.' This is a saw hung on a horizontal arbor above the double circulars, and cuts down from the top of the log to a little below the arbor of the middle saw. While, of course, it is parallel to the two lower saws, its cut is made four inches out further into the log. Besides this saw there is a fourth smaller saw, which is hung on a perpendicular arbor, and makes a horizontal cut into the log just at the bottom of the cut made by the third saw. The effect of running these two saws is to rabbet out a piece, extending from the top of the log to a little below the arbor of the middle saw. These three larger saws are usually from 60 to 64 inches in diameter, and mills thus arranged can cut logs eight feet in diameter. Logs larger than that must he split.

"There are about forty mills engaged in cutting redwood. The largest have a capacity of 75,000 to 80,000 feet per day. Perhaps the average would be about 40,000 feet daily.

"But very few, however, run all the year round, both on account of the difficulty of keeping supplied with logs, and because the places where many of them are situated are not safe harbors for shipping in winter. As very few of the mills are connected with the market by rail, nearly all the lumber is transported by sail vessels.

"The amount of redwood lumber sawed by these mills in 1881 was not far from 140,000,000 feet. Of this 95,000,000 came to the port of San Francisco, 4,500,000 feet being reshipped to New York and foreign ports. The balance of 45,000,000 feet manufactured was distributed to the lower ports in California, Mexico, South America, Sandwich Islands, Society Islands and Australia, vessels going direct from the mills."

The above repeats to a certain extent, or rather goes over the same ground to be found in other pages of this book-album; still it shows the fact that all expressions of opinion as to the commercial value of redwood do not materially differ.



LOGGING TRAIN. GYPSEY ATTACHED.

MANAGING SINKERS IN WATER.

In following the redwood log from stump to mill, by rail and raft, it may occur to the reader that one little bit of information is lacking. And it is an answer to an inquiry invariably made by a stranger, how the butt logs that sink in water are rafted to the mill or run down the stream. The current of the streams down which the logs are run to pond or boom at tide-water, is so strong and swift during the "running" season, that boulders weighing twenty or thirty tons, not firmly imbedded in the earth along their banks, are rolled along like pebbles in a mill stream. How much easier is it, then, for a smooth, round "sinker" or butt log to make any resistance? So rapid are the streams that a "jam" is impossible. It is after arriving at the ponds or tide-water storing grounds, where the sediment from hills has settled, that the "sinker" becomes troublesome to the raft-men. To place them in line of march to the mill, after they have settled in the mud at the pond or at tide-water, two floating, scow-built boats twenty-five or thirty feet long are employed. These boats are rigged with windlasses, chains and grab hooks. The position of a sinker being ascertained, two floaters, or logs from the upper portion of trees, are floated to the spot, upon each side of which the sinker is to be fastened; the grab chains from the scows are lowered, and the sinker is raised to the surface. Then the three are joined together by short iron chains, having thin wedges attached at each end and driven solidly into each. Thus the sinker is supported and rafted to the mill.

A description of the redwood saw-mill here, in detail, might seem unnecessary to the practical millman; for, as before stated, the process of manufacturing is not materially different from that of lumber mills everywhere, the distinguishing feature only being the "Evans' Third Saw." For the benefit of the novice, however, we quote from Bonner's graphic description. While it does not go into full details and give technicalities, it may give to the uninformed a general idea of the work performed in a saw-mill. He says:

"In these mills, as in the woods, one is quickly impressed with the fact that the work is not the easiest in the world, nor the most desirable to a 'thin-skinned' person. The incessant din of machinery, the flying belts and pulleys, the endless chains, the rattle and jar, the escape of steam; not to mention the inclines and chutes, and other contrivances which seem to be ever waiting to swallow up the unwary, must make it a perfect pandemonium, and place of fear and dread. At least, to the visitor they seem all this. Now a log comes creeping up from the mud and slime of the boom! Beyond you the great saws are screeching as they hurry through the log, which may have been growing yesterday miles away in the forest; to your left a small flat car, propelled by two men, bearing away bits of slab and small rubbish to a mild sort of Gehenna, which is ever kept burning, fifty or sixty yards beyond the mill. From the saw carriage runs an elevator, which carries the sawdust down to the furnace room, or directly into the furnaces. To your right the great planers send out their demoniac yells, as they take the rough surface from the boards. And then the chutes, down which the lumber scurries away to the wharf below, there to be sorted and piled, and loaded upon ships or cars or wagons, and started out on its mission among men. To the visitor, at least, all this, and much more that can hardly be described, makes the most perfect state of confusion imaginable; and yet the business goes on as smoothly as possible, and men work away as quietly as if they had no such thing as ears or nerves."

CREW AND WAGES.

The number of men employed at the redwood saw-mill vary according to the size of the mill and its capacity for manufacturing lumber. The product, per day, of the largest mills ranges from fifty to sixty thousand feet, although where the logs are not so large as to cause inconvenience in handling, from seventy to eighty thousand feet per day is of common occurrence.

In these mills from sixty to sixty-five men are employed. In mills having a cutting capacity of 30,000 to 40,000 feet per day, an average of thirty-five men are employed.

The shingles cut from redwood timber at mills built especially for that branch of lumbering, in addition to those connected with nearly every saw-mill, figure largely in the drain upon the forests. And to these may be added the "shake," or the three-feet shingle mills. Mills built especially for the manufacture of shingles or "shakes," buy their stock in bolts from small timber owners, or supply themselves from a claim of their own. These mills employ directly or indirectly from fifteen to twenty men each. The wages for men working at the mills, either lumber, shingle or shake, depend entirely upon the work they are fitted for, and the ability to perform it. "There is no soft berth around a saw-mill," is an old saying among men that have ever had any experience in the business. The saying will apply with equal force to any department of labor in the manufacturing of lumber, from the tree to its pile in the yard. It is therefore very difficult for millmen to secure employees adapted to the work, who have the physical strength and natural genius combined to continue long in their service. When one man is found that can stand the wear and tear upon him, five will prove to be failures. Hence, when a crew of men is made up which gives satisfaction, it will not be broken for the sake of a few dollars per month in wages. It is well known that lumbermen pay the highest wages, for competent men in their separate callings, of all employers on the Pacific Coast. There may be an occasional "off" year, when the lumber market is dead, and the product will not pay a profit to owners, temporarily, when a reduction of perhaps ten per cent. is a necessity to keep the mill running; but take it for seasons together for a term of years, and the millman's or the logger's employees command wages far above the average of workers at other trades. And there is no good reason why they should not, for the labor is hard and requires good judgment as well. The head sawyer, engineer, head planer and filer command salaries ranging from $90 to $100 per month. The different responsible positions filled, from the gang-edger down, command from $40 to $80. In each case board and lodging are included.

Dolbeer & Carson's LOGS READY TO RUN. Elk River

Now take the number of men employed from the tree in the woods to the yard at the mill, and their combined wages (which are cash when called for) make a big hole in the receipts of the lumberman, who must ship his product to market, sell (perhaps on thirty or sixty days' time), and collect the proceeds.

It will be seen at a glance from the number of men employed to carry on the lumber business successfully, build mills, railroads, booms, landings, dumps and camp cabins ; buy provisions, replacing broken shafts, saws and working implements generally, in addition to freights and office expense, that a large capital is required. Not only these, but the risk by fire and flood is great. Insurance companies refuse such risks unless at an extremely high figure, and the breaking of a boom full of logs which may be carried to sea causes heavy loss. Only prudent management in these matters makes the lumberman a success. And when crowned with success, he has deservedly earned it.

As an example of the outlay for the successful operating of a big lumber firm, let one take into consideration the capital invested and the army of men employed by a few of the leading redwood lumbermen.

The largest number of men drawing pay from a single Company or firm, are on the rolls of the California Redwood Company. In connection with the manufacture of lumber, this Company own two tug-boats and a bay steamer (sternwheel). The tugs are not used exclusively in hauling the Company's sailing craft out of Humboldt Bay to sea, but are employed by captains and owners of all ocean craft entering or departing from that harbor. Together with the tugs, two mills having large manufacturing capacity at Eureka, another at Trinidad Bay, twenty miles further up the Coast; a complete machine shop; two lines of logging railroads; nine logging camps; road graders, and others extending branches and employed upon new ones; as well as book-keepers, cashier, scalers and raftsmen—no less than one thousand men draw pay, at an average of $3 per day. In addition to the ready cash required to meet the demands of these workers, is that for paying for the tons of provisions which they consume monthly. Their timber resources have already been mentioned.

Next in magnitude of operations come Dolbeer & Carson. They operate with two mills; one at Salmon Creek (this creek empties into South Humboldt Bay at its southerly extremity), and the other—one of the most complete on the Coast—at Eureka, on North Bay. As a timber supply they have in one township, about 10,000 acres, north of Mad River, in which, it is said, an ax has never been used. In addition, they have large reserves on Elk River, Salmon Creek and its tributaries. A stern wheel steamer is utilized for hauling rafts up the bay from their boom on the Elk. In good lumber seasons, when both mills are running at their full capacity, they employ about four hundred men, paying wages, proportionate to the employees, the same as the California Redwood Company. In fact, wages in each department of labor are the same among all redwood lumbermen on the Coast. Their investment in mills, railways, sailing craft, etc., is large.

Korbell Brothers & Company, or rather the Humboldt Mill Co., and the Arcata & Mad River Railroad combined, employ some two hundred men at mill, in logging camps, and upon their railroad, which terminates at Arcata, located on the extreme northerly arm of Humboldt Bay. The railroad performs service beyond the freighting of lumber from their own mill, which has a capacity of from 60,000 to 70,000 feet per day. The timber possessions of Korbell Bros. & Co. are large, but precisely how large have never been made known to the local authorities of Humboldt County. There seems to be no doubt, however, that future contingencies were provided for before the track of the railroad was laid to the Blue Lake region on the north fork of Mad River, or the sills laid for their complete saw-mill.

The Gualala (Walhalla) Mill Company of Mendocino County, composed of S. H. Harmon, Capt. C. L. Dingley, J. H. Anderson, F. & W. B. Heywood, better known under the firm name of Heywood, Harmon & Co., have every facility for manufacturing redwood lumber. A mill with capacity for cutting 50,000 or 60,000 feet per day, and logging roads tapping a forest owned by them of 20,000 acres, require the services of some two hundred workmen.

R. G. Byxbee, successor to H. B. Tichenor & Co., employs at his mill in Mendocino County one hundred and fifty men. The timber reserve of Mr. Byxbee is said to cover 20,000 acres.

Henry Wetherbee, successor of the old firm of Wetherbee & McPherson, has also large interests in Mendocino County. The Albion River Mill which he owns is supplied with logs from the Albion River, Pudding Creek, and other tributaries.

During the cutting season, he employs about two hundred men. Wetherbee's timber possessions on the Albion and Noyo Rivers and their tributaries amount to about 18,000 acres. Of this sum, four thousand acres have been logged. There are other redwood lumber interests in Mendocino County, but special mention is not necessary, even had we space in these columns to do so.

Through inadvertence, we have failed to mention in the foregoing list of heavy lumbermen at Eureka, Humboldt County, the name of John Vance. He is one of the pioneer redwood lumbermen of the northern belt, and was the first to introduce in his locality the logging railroad by which to supply mills on Humboldt Bay. His old saw-mill at Eureka is still a monument of his early enterprise. Although it has a shaky appearance, and its interior works are of an ancient style, it produces some 30,000 feet per day of as good redwood lumber as finds its way to market. His Mad River railroad supplies this mill from his tract on the Mad. The logs are dumped into a slough or arm of the north bay, and then rafted by the assistance of a stern wheeler to the store-grounds at Eureka. Another mill of about the same capacity as the old one is in operation on the north side of Mad River, and also supplied from the same tract of timber, which, for quality and quantity per acre is not excelled. Mr. Vance employs at his two mills, on the railroad, and in logging camps, from four to five hundred men. Then there is the Occidental Mill Company at Eureka, employing indirectly one hundred men; Flanigan & Brosman, a like number.

In addition to these mills there are three or four to be constructed during another season; the largest contemplated

Dolbeer + Carson's LOGS AT THE LANDING. Elk River

is one for the Pacific Lumber Co., on Eel River, the lumber of which will come over Eel River and Eureka new line of railroad, which also taps the Van Duzen, Yager and other tributaries of the Eel. To the visitor, the timber resources of the Eel and its branches appear inexhaustible, and yet they are doomed to satisfy man's insatiate lust for gold.

The following table, compiled from statistics furnished by Mr. E. H. Allen, the efficient Secretary of the Redwood Lumber Association at San Francisco, shows the amount of Redwood Lumber (sawed) received at San Francisco for each year since and including the year 1863. Also the lowest price for clear and common or merchantable during the same period, cargo lots.

Year.	Receipts, feet.	Consumed, feet.	Clear.	Common.
1863	46,039,217	43,022,597	$26 00	$16 00
1864	40,425,472	41,591,177	26 00	17 00
1865	53,818,074	53,037,753	28 00	16 00
1866	59,245,335	60,174,310	28 00	18 00
1867	70,738,738	66,665,954	30 00	20 00
1868	80,617,767	84,754,183	32 00	20 00
1869	90,462,709	81,899,095	26 00	17 00
1870	83,870,673	87,706,213	22 00	13 00
1871	77,193,265	75,295,952	23 00	14 00
1872	94,241,408	89,782,618	30 00	16 00
1873	70,944,837	73,870,244	27 00	17 00
1874	92,325,576	95,545,490	25 00	15 00
1875	116,252,814	110,231,073	30 00	18 00
1876	116,018,070	113,011,014	25 00	15 00
1877	104,240,834	107,330,749	23 00	13 00
1878	93,546,786	92,227,814	22 00	12 00
1879	87,493,729	88,122,653	18 00	12 00
1880	80,390,297	80,731,664	20 00	15 00
1881	95,414,556	93,565,989	26 00	17 00
1882	97,265,434	94,606,063	28 00	18 00
1883	105,272,543	103,195,515	30 00	18 00
Total	1,755,818,134	1,736,528,120		

The receipts and consumption, as shown in the foregoing table, only give the number of feet arriving at and departing from San Francisco, or consumed in the city. No record has been kept of shipments made direct from harbors along the coast of Mendocino and Humboldt Counties to southern ports, to Mexico, South America, Sandwich Islands Australia, China, and Japan. The principal exports have been of clear stuff, large quantities being dispatched to foreign ports from Humboldt Bay. The foreign demand, in Australia particularly, has almost entirely been for clear rough. In 1883 Australia consumed some 1,500,000 feet of clear, most of which went direct from Humboldt Bay.

The Redwood Association has only a record of the percentage of clear received in San Francisco since and including 1880, up to January, 1884, as follows:

	PER CENT. CLEAR.
1880	45
1881	48
1882	50
1883	51

From the statistics of the Redwood Association as to the percentage of clear received at San Francisco, together with the amount of clear shipped direct from Humboldt Bay to foreign ports, it is safe to estimate the total percentage of clear manufactured in Humboldt and Northern Mendocino at 60 per cent. In this estimate railroad ties, shingles, split pickets and shakes, all of which are necessarily clear, are not figured. Hence, it will be seen that our estimate of clear—60 per cent.—given in a preceding page, was rather under than over the mark.

Within the past year the California Redwood Company have shipped to England about 5,000,000 feet. This is only an entering wedge, to introduce redwood abroad. It is reported that the English and Scotch lumbermen look with favor upon this new (to them) building material.

When transportation facilities are complete, either by rail or by water, as heretofore stated, as they certainly will be within a few years, it needs no prophet to predict that the California Redwood will, in the near future, have no rival in the lumber marts of the world.

Within a generation to come the question will be asked: "How long will the Redwoods last? A few years at most. But in that brief time men will build their castles and their thrones of power upon the mighty race of giants, with the one regret that there are no more to conquer."

Dolbeer & Carson's LOGS AT THE LANDING. Elk River

ESSAY UPON REDWOOD.

[Specially written for "Redwood and Lumbering in California Forests," by Dr. A. Kellogg, of the California Academy of Sciences.]

Confronted by a Redwood forest, our powers of adequate description pale before these mighty monarchs of the far western wilds gloaming mountain slopes, rich river bottoms, or marching in solid phalanx adown the deep glen so dreary; anon, striding, another Atlas, up to heaven's gate, they challenge the stormy height, as it were, careering under bare poles, whilom chanting sublimer patriotic songs—"For our flag, it was still there!" Who can duly appreciate all their mighty magnificence, mounting up among the thick boughs, where also the eagle maketh her nest on high, the bird of freedom gathereth under her shadow!—all the grandeur of their vast dimensions dimmed by distance, whether we look towards the lofty empyrean or far away after their high horizon! Redwoods of most enormous proportions, 200 to 350 feet high by 10 to 20 feet or more in diameter, towering the grand trio! sentineled our entrance of the Golden Gate in August, 1849; they then also lined the immediate Pacific Coast of California, from San Luis Obispo or near the northern boundary of Mexico to Oregon; here and there vanishing inland altogether from view. Note their clean and elegant trunks, Grecian pattern, cinnamon-red bark, fluted, as the deep, swift water moveth without let or hindrance, 75 to 200 feet of sheer shaft—these, in brief, were our lofty landmarks, objects of intense interest; for they were the great colossal characteristic evergreen emblems of laudable ambition, and our golden goal! bold! nay, sublimely awe-inspiring! mighty monsters, these most imposing herculean pillars of the heavens, from out whose blue vault they looked abroad o'er land and sea, high above the hill-tops beyond the Bay, bearing ever aloft triumphantly freedom's golden crown, responsive to the last lingering rays of the sun, as he sinks to rest in the western wave! Alas! what wits it now to us to know whether they saw the Vandals, or the Vandals saw them!

Viewed from these higher interior summits, redwood forests are full oft, in their season, overwhelmed in a billowy sea of watery atmosphere, so perfectly immersed as to quite equal a light rain, or so permeating with wet, that even shelter above is vain; hence these trees are transiently obscured, and more commonly of a summer's eve altogether lost—lost, until the thick fog lifts the following day. In order to realize this scene in some highly appreciable sense, one should take somewhat of a bird's-eye view of it *at a distance;* and although charming at all hours, declining day, or best of all, in early morning at 10 to 11, when the slant light strongly defines the lights and shadows on the denser low dutch, tumuloid, tumble-down sort of fog-clouds, as they "roll in at the Golden Gate," or crowding up over hills, flowing down dales, slowly filling deep gorge, wild wood and wider vale--here and there in a hurry—anon, stealthily as the cautious Indian, reassured, they emerge from out embroidered foliage, surprising one as an apparition, pale and gray as a ghost from the shades! comfortably, afar off, as it were *on dry land*, this eternal drip is not so annoying—to *contemplate!* On our high places, spell-bound, one may sit for hours in pleasant reverie, watching the changing, billowy abyss. Soon the cambric night-curtain lifts, and vistas of grandeur and of glory, beauty unwonted! and still they rise, refreshed and charmed as a morning bride in her vail: but to dwell on these ever-varying visions would be to write an endless volume! Suffice to say, our redwoods are only found within the limits of these frequent fogs, five to fifteen, rarely thirty miles inland, and probably never beyond forty, even in the most favorable low portions of the coast, where fogs pass unobstructedly through open gaps and freely along the lowland vales. These majestic John the Baptist Cedars seem to possess a magic power over passing fogs, precipitating them, and as it were, sprinkling with a continual rain the loose ashy earth, or usual sandstone soil at their feet: strictly speaking, rainless earth-clouds are they, from on high; nevertheless, distilling a continual supply to replenish living springs of the purest waters that ever bubble and babble at the charming redwood's bidding; they are therefore choice guides to, and guards around, the purest fountains and general water supplies of the Coast Range wilderness; but for this very reason, most lands are apt to become too miry beneath them for public highways and private avenues, and for rural retreats they are altogether unfit.

The numerous branches are small and very short, relative to the huge size of the body; in age they become quite insignificant, as it were mere appendages, so intently devoted is this *Redwood Cedar* to the all-absorbing timber-producing purpose of its great sylvan tower; this enables them to close their ranks, and crowd the land with an immense amount of timber *per acre*, in some rare cases from 1 to 3,000,000 feet —millions absolutely unparalled, save by its great Sequoian kin of the Sierra. This species, therefore, is only second to the *Giant Washington Cedar* of world-renowned fame; and like that, too, the redwood attains to thousands of years of age! and what is even more marvelous, the monstrous stumps after the tree is cut down—and one would suppose utterly destroyed—even at the extremest age and size, still they maintain their original vitality, for they forthwith shoot up unnumbered saplings of great vigor, and exceeding rapidity of growth; only continued repetition at brief intervals will kill them. It is this sprouting from the stump and parent roots, like the olive, that forms those social circles within the usual area of 30 to 40 feet or so; when thus renewing their youth in such close proximity, two or more may unite to form one large tree. Realizing types of loving fables, and lasting friendship both of classic and legendary lore—these, though not apposite to our purpose, yet

"Oft we hear their soothing voice
Low whispering through the shade."

From this it will be seen that the timber-supplying capacity of a redwood forest, under judicious care, is so pro-

LOGGING TRAIN.

digious as to seem almost incalculable, because illimitable. We say "*care*," because only at this juvenile age can fire harm them; also their daily fog-condensing foliage referred to renders them, for the most part, almost forest-fire proof; at length, with age, what the damp woods lack to absolutely hold in check, the forest fire-fiend is supplied by a most peculiar kind of red or cinnamon-brown bark well worthy of a study—consisting of a thick coating of light, porous, readily shreddy-fibrous, lamellar mass of coarse-satiny substance of a dry, peaty, silicated texture, without even a vestige of either oil or resin, so common in other conifers, or to their renowned and sacred kindred of the old world; is apparently dry of substance, if not of surface, and so nearly fire-proof as to simply smudge and apt to charr superficially, so that it rarely heats to injure or to kill trees of a few inches in diameter. If, however, it does penetrate deeper, and burn for a long time, it seems not to kill the thin, paper-like layer of living bark beneath. It is also a notable fact of general repute that might be mentioned here, that a somewhat similar resistance appertains to the timber: houses built of this wood are not so combustible as those of pines and other large constructive joinery; broad surfaces of it always fire with difficulty, and the slightest dash of water quenches it quickly, like the suddenness of a puff on a candle blaze. Consequently, for this, and reasons hereinafter given, most houses are built of it in California. But returning, the bark of redwood ought to be better known—but as yet, it has but slightly attracted public attention—almost utterly going to waste; nevertheless, it has manifold properties, and uses unnumbered; its magic dryness in the midst of mire and moisture is something amazing—and to bridge over by a safety coating against wear and tear, and to facilitate easy transit of great weights over bridges and rough roads—manufactured into upholstering or mat material, etc.; summarily, it is safe to say it would in one way or another meet a thousand wants. But the reader must accept general and suggestive hints—his own thought will supply the rest. Let us pass on to consider those uses already known or soon to be more fully utilized. This course is too often forced upon enunciators by the popular plodders like ourselves, who are most of all wont to enter into other people's labors; albeit we turn again and read with ridicule our antecedent and best benefactors. Why so?—forsooth lest the firm of "Proud Us & Co." be under some obligations somewhere in the universe—heavens above or earth beneath. But whatever judgment posterity may pass upon the men of this day and generation, we seem doomed to be "famous according as we have lifted up axes against the thick trees."

"Redwood!" Yes, for the wood *is* red, with a faint, coppery, or metallic iridescent gloss; and so also is the bark, as above mentioned—hence the appropriateness of the common name. As a general remark, the grain is true to a line, and splits with amazing precision—noted for thus making timbers and ties, rails and pickets, shakes and shingles by annual millions. In this species "redwood" (*Sequoia sempervirens*), the leaves are like the yew, spruce and cypress, that is, small, half to an inch long, a line wide, and line-like, with a prickly lance or awl point, of course, distinctly arranged in two rows; rather dark, dull green above, the under-side soft, grayish green; this two-ranked character of the flat, final, starry spray of tiny twiglets, tipped with the first young growth of spring, is of a bright and even vivid yellow-green verdure, as tender and listless in its repose as an infant on its mother's bosom! Yea, for gayety of beauty and for grace, these branches excel the choicest flowers and prettiest ferns; reminiscent of the charming Spring spruce groves eastward, redolent of Eden odors! But for grander display in this Spring state, and in every other way, these thrifty young redwoods exceed them all. Somewhat mixed with the common foliage are always to be found some spaces of leaves reduced to mere scales; and occasionally a few trees in every grove have altogether awl-pointed, tiny, scaly leaves, similar to the great Celestial Cedars of the Sierra Nevada mountains.

Although we have observed that these garland-like limbs are chiefly spreading, nevertheless, like all conifers of weak and slender branch, in great age, they too are apt to become more or less tent-topped, especially as tipped and gracefully drooping, with male flowers, like their mammoth kin; or pending, tiny, terminal cones of an oblong shape—one to one and one quarter inch long, and one half to three quarters of an inch thick. These numerous trapezoidally disked scales are thick and roughly implaited by the indrawn or quilted-like center; this shield-like disk is not only thus puckered in, but marked distinctly by a sharp, laterally transverse ridge stem of this scale stout, compressed, broadly wedge form, with some sharp angles, persisting, covered and stained by a dark purple, almost black, shining, fragile and granular secretion, like *Gum Catechu* (tannic extract of an *Acacia*), of the apothecary. Seeds, three to five to each scale: flattened oval, or obovate in outline; the lateral wings very narrow, or slightly and often obliquely margined; color, dark reddish brown; only a little notched at the outer and larger end—altogether shaped like parsnip, or other similar seeds.

Having thus far briefly sketched the general aspect, proportions, bark, foliage, flower and fruit, here and there only a general, casual allusion to color, texture and quality of timber, some few details and associative remarks must close the natural history of this other great tree-wonder of the western world. True, some of this timber is marked by bluish, iron-tinted, or dark and almost black seams, with varying shaded clouds that curl the glossy, highly finished surface; but the prevailing hue, as observed, is reddish in both species of Sequoia, the best proportions of which are scarcely less durable than the underlying rock foundation upon which they flourish. Vast stumps ten to twenty-five feet in diameter, often twenty feet high, where the chopper's scaffold is usually constructed for the felling notch, especially where the best of these abound—of Humboldt, Elk and Eel sections north—the more immediate basal body-sweep of root-spurs of the higher and dry land timber would yield an immense amount of the choicest ornamental curled lumber in the world, scarcely less valuable than all the other parts of the tree put together. There is, therefore, more left and lost than is taken and gained by present methods—as will better appear further on.

Let the reader please consider we have almost two million acres of redwood soil—intact, or scattered and partially despoiled—but if half or a quarter of that, what a ruin is spread around and lost!

Dolbeer & Carson's **GOING INTO THE MILL.** At Bay Mill.

With access to tide water—great economic value—universal uses—scarce a remote rival—an all but imperishable cedar! It cannot be urged that the commerce of the world has no demand for such invaluable timber. The most plausible excuse that occurs to our mind is, that enterprise and capital have not been called to it. A great "deal"* of such fine cedar-wood ought to find its way into foreign markets, like similar conifers of far less value from India and other parts of the world.

Another point, perhaps the more worthy of note, because it seems so inconsistent with a preceding statement of the very perishable nature of some parts and sorts of redwood, or conditions precedent to use, viz. in regard to the more brittle, homogeneous, soft top, portion referred to—which, in the recently cut timber, is, to a great extent, not to say entirely, rejected as refuse—or only a trifle here and there used as indicated. But whenever the storm splits away any of these tenderly brittle tree tops *in their living state* just at this apparently poorest portion, they slowly season for ages; and yet it often seems only as an accident of yesterday, so fresh and free from decay are they! (albeit some perish when the soil itself is at fault). Here, too, is the favorite lofty watch-tower of the great "Imperial Woodcock" (*Campephilus imperialis*) that haunts the lonely dell,"—here, too, he rolls his loud love-call * * * far through the hollow wood-lands resounding! Or, perchance, the wary sentinel, perched upon these high places of the far western wild-wood—listening and intently looking, his keen and curious eye descries the enemy! Anon the tell-tale telephone sounds the alarm * * * soon, too, *he* is gone the way of the distant and scarcely audible answering echo of his mate. Anon, the leaves begin to fall, and the early shadows to decline. Conscious of the low, charioting, wind-waves as they begin to roll unwontedly along the forest foliage, louder sounds from afar off, borne upon the fragrant autumn breeze * * startle and begin to disturb the long silence of his serene abode; and in ways unnumbered and unknown to man, oft from his lone tree-top he tells the sad tale of an approaching storm, cautions the trees, and those to whom they correspond and represent, to beware! Or, putting question or query more intelligently, as seen in the light of right reason and due reflection—and is it possible to avoid the conclusion that storms also proceed in a trinal order, from end, cause and effect—conditions prior, posterior to postreme—first, middle, and last—or in its own elemental series from primates by intermediates to ultimates? or with any other dress your own idea of thought may choose to clothe it—hence physically prophetic tests of the Government Signal Service, or Weather Bureau! or those other finer and purer telegraphic and telephonic animal nerves or excitive vegetable fibres to become all astir preparatory; or higher still, gifted humanity! May they not then, together one and all, *sense the coming storm?* and in many cases not only *feel*, but perceive, see and *hear* as we have heard the coming raindrops in the preceding wind—if you please, hours, days, nay, weeks before it came, *de facto*. Now these aural with ethereal—rarer and less rare to condensed watery material, are alike substantial, and as such, tangibly sensated—the one of the same or similar form and nature as the other, purer or grosser, and so, *prophetic by law*, aural, magnetic and aerial clouds and storms are to some extent, and ought to be generally, recognized—nay, solid, metalic, meteoric and earth storms, too, included! And be it known, these greatest, tallest trees, aspiring to serener realms above, beyond their watery, cloud-capped summits, have also their great forest-loving Weathercock of the Wood—for a use. Among sundry and divers other fall forebodings—nay, the never failing forerunner of the wintry storms of the far West, we behold the great presaging Pacific swell come rolling in, and lifting up a mightier portentous wave, breaking tumultuous along the sounding shore! rampant, the surf's roar is borne higher on sonorous wings of a clear, cool, and more humid autumn air—resounding far over dismantled highland hill, re-echoing the great Coast Range crest! ever and anon louder wave-tones emphasize mine ear! And why not they, these, and those other signs, impress all animated nature as well! Even so, let his imperial highness, the fiery-plumed knight, go his wont aloft to picket the lonely outpost—climbing his pinnacle of fame—the majestic redwood rampart—rolling his wild reveille; while the sweet little water ousel warbles her feminine song beside the pure brink sheltered beneath the green shade at his feet! Testing this resonance on the fallen tree, listening, methinks I hear the soul of the viol pining, imprisoned! —or anon the silent harp wakes the long slumber of the ages!

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*"Deal," be it noted, is the old Anglo-Saxon for "dael," a piece of wood—German "diele," in early times a piece of wood riven by a "deal-axe," or froe—and still this and other like free-splitting timbers are the sylvan joy and blessing of the early pioneer.

> "Let not this harp neglected lie, awake its silent strings,
> And spirits from their depths will fly, with music on their wings.'

Few of our readers can realize the great loss by smashing up at the tremendous fall of these giant Cedars, as they plunge headlong, thundering down the dark forest and deep glen, spreading ruin broadcast, as seen everywhere, save where so soon as possible it is burned out of sight.

As for any graded uses worthy of the name, either of the upper lighter, or lower heavier parts, or for fuel, these and many other economics are unheeded, if even heard of; yet upon these wastes it is not so much our purpose to dwell, although we may refer to them time and again. Moreover it is pertinent to any forest, to make a passing remark upon its local and general climatic influences and extra commercial uses, for this not only concerns us, but the most part of mankind, if not all.

We have often heretofore passed in our testimonial observations from numerous examples known in all lands, localities the most notable and close at hand, and of every clime; yet there are thrice negative minds doomed still to walk benighted beneath the mid-day sun, themselves their own dungeon, with evidences clear as day all around them, evidences of the manifestly injurious effect of indiscriminate and heedless forest denudation : of course, this is not the place to present such vast arrays of proof; we can only affirm what every tyro knows; the drying up of springs, streams, wells, and waterpools, yea, sweeping away every vestige of vegetation, robbing and devastating the power of future production, and even banishing the very soil itself! Why not, then, place these forests under specific and provisional lease for a term of years, to revert to Government, State or National, to

"EVANS' THIRD SAW.."

be again protected whilst the remnants and roots are recuperating the dismantled forests; and the more so, seeing all are agreed *that an enlightened public policy requires it?*

Among many, some may differ as to the extent of climatic and other influences, such as arid, bleak, irregular, or variously *impoverished* wind—we use this expression advisedly in manifold senses—because, for aught we know to the contrary, forests as vast alembics may filter and purge, purify and exhale much invisible, and so to speak, aerial and highly fluid food upon the bosom of the breeze, ready to be appropriated and vitalized at once, nursing, nourishing and guarding not only men and animals, but benignantly ruling at the head of its own realm, with trees of honor, from the high cedar unto the low and vulgar bramble; for none liveth solely unto itself. Thus the leaves, after drawing up and preparing such and similar pabula, then they too fall away, and furnish the grosser earthy humus, salts and soils so well known and needful to forestal exhaustion, so imminent in the natural course of growth, of culture, or of abstraction, and of waste. May there not also be more recondite magnetic, electric, and aural influences that, at least, serve to stimulate—as ample experiments seem to confirm—or to compromise all the extra hypothetic and probable? Suppose we agree to relegate the whole mystery to their known and more palpably demonstrable and mighty tempering and irrigating powers, since enough is known of *these* beneficial effects alone to warrant the utmost concern; and all that, superadded to the commercially economic foreshadowed, or to be hereinafter more fully substantiated. So long as trees and shrubs clothe highland, hill and mountain, neither drought nor flood are likely to afflict the fruitful vale or rolling plain; health and plenty abound. Even a small belt of a few rows of trees serve to intercept malaria, when filthy fen and swamp are left undrained; but cities and nations, numberless for multitude, have been made a barren waste and depopulated by the removal of their trees; anon, restored by their planting, or their natural growth. Yet in Egypt, where no rain often falls for a whole year together, Mahomet Ali, by planting trees, caused an average of thirty rainy days in a year! Our own personal observations of instances, although not so historically authoritative, would fill volumes.

The preceding general remarks give us in outline, for the most part, the principal characteristics of one of the most wonderful, and at the same time most useful, of all the timber trees of the known world. These two *Sequoian Cedars* —maritime and alpine—seem to embody, combine and concentrate more durable and available timber material to the given area of land occupied, than any other genus of trees hitherto discovered; or one to two million feet to the acre. Let us, then, return and review the manifold points of practical consideration in order more fully to confirm the truth, and obtain some proximate, realizing sense of the subject. We have, in some sense, seen that for health, vigor, longevity, phœnix-like vitality of rehabilitation, and only less than perpetual durability, at its best; and, as we shall further show presently, that they stand pre-eminently unrivalled. To this end, we must appeal to numerous collectors of facts and figures set forth by the most reliable local writers, together with the best results of applied workers at home and abroad, in all departments of those uses for which this timber has been commended. As we have before suggested more careful choice of quality, and as this also greatly depends upon judicious sectional selection—as for example, the lighter softer, more homogenous textured, that neither expands nor contracts with varying humidity, from the higher off-coast of Humboldt regions; so for the harder, stronger, less fragile, from the nigher coast middle region of Mendocino southward, must need be well chosen for given purposes indicated.

It must be confessed that little has ever been done in this line as it should be, to do justice to any timber whatever; but besides this more northern and relatively sheltered Eel and Elk River region, groups, groves or specimens anywhere in higher, drier soils; as the wood is well matured, or, so to speak, *ripe*, the uniform testimony is that it makes the best timber. Now, the experienced and observant woodsman will readily select for you many such choice trees in any locality where they are found at all; but it is not always easy or practical for him to communicate this art to wiseacres, and he is generally too sensible to talk tact to a tyro among the trees; or even with the very best intentions, kindliest inclinations and efforts, very little tree-lore will ever fall to the lot of us inland lubbers amongst this sort of lumber—or indeed, thorough knowledge in any branch, uninitiated. Nevertheless, if the top-leader of a trim and shapely tree has been snapped off in years of yore, and is still sound as a bell—as it is most sure to be, so long as the main shaft itself remains alive—it is proof positive of prime stuff throughout. Could this, by arrested growth, so operate as a cause of quality? Or is it not rather the result and evidence of a tenderness of texture too delicate to withstand the tempest? Besides, when this sort of trees reach three to three hundred and fifty feet, stiffened and cranky by size and age, the sway in an ordinary breeze is even then several yards at top, and in a storm, such an all-powerful snapper, no timber over-ambitious of its neighbor, can stand.

The writer, many years ago, in passing through the redwood region of Humboldt and Mendocino Counties, surveyed these forests in their primeval grandeur. 25,000 feet to the acre of outskirts to 50,000, or even 80,000, is officially given by the Government; but if fairly taken off in any foreign or best civilized European sense, the yield would reach more than a million, if not even two million feet of timber to the single acre of well selected areas; true, only 96,000,000 are said to be shipped to San Francisco annually. The lowest estimates now available—and these, of course, only conjectural, as to the amount shipped to foreign ports direct from the mills—some put this as low as 35,000,000; but as we export redwood now to nearly all parts of the world—for example, to Peru, Mexico, Honolulu, Australia, Tahiti, Chile, Central America, Europe, Asia, East U. S., Siberia, Japan, Panama, Marquesas, British Columbia, New Zealand, and elsewhere, with thirty to forty large market mills with at least twice the capacity reported, it must be simply immense. Although placed at 131,000,000 in all, it can scarcely be doubted that it is nearly as much more. Neither do those figures include the small mills for local demand; lower, best butt logs

Kolbeintlaar
[illegible] Laar
Bay [illegible]
[illegible]
19

or sinkers, which are rejected, and left with stumps and tops on the land. Also, for obvious reasons, the reader will readily understand that where private interests lie in the line of concealment from the public, on account of combinations, those ostensible figures given are rather more liable to be under than over the actual truth.

Trees exhumed from dry gravel, and sandy or loamy soils, or washed out in the ever-deepening valley drains of the hillsides of the peninsula around San Francisco—caused by dismantling the hills of their rain-detaining trees, shrubbery, etc.—these fallen trees, as observed, have been frequently found perfectly sound after untold ages. Indeed, nothing is more common than to find enormous prostrate trees under the most damp and trying conditions of our foggy-coast forests. Writers give unnumbered examples like that reported in a recent number of the "Rural Press," briefly:

"F. R. and A. J. Hooper, of Trinidad, in 1852, whilst building a railroad, were obliged to fell a redwood tree one hundred and fifty feet high by ten feet in diameter, which had grown from seed fallen upon the top of an ancient ancestor. Roots ten inches in diameter had grown, overspanning the fallen tree, which was still sound, and furnished stringers for a trestle." Yet in similar conditions of the self-same forest, some firs and oaks rot into fragile masses, that will crush and fall away beneath your feet, in five or six years. In both species of these reverend cedars we see immense old heart-logs spanned by the roots of living trees—trees of centuries agone; and yet even now they afford the most select and choice lumber to be found. We say "choice," because the recent wood is often too light-colored, whilst this is darker stained with age, beautifully tinted and shaded; curled-grained pieces abound in these cases, made and provided for the handsomest ornamental cabinet and similar purposes—certainly equal to the best mahogany. We may safely say we have never had the good fortune to see any mahogany that for beauty would favorably compare with it.

In passing, it is worthy of note that such lumber is not so subject, if at all in any appreciable degree, to that irregular shrinkage which is apt to mar the smoothness of the surface of the middle and more southern coast timber. We allude to the soft, cellular interspaced portions, so to speak, between the grain, shrinking away from the harder, horny portions of the wood, thereby roughening it into ridges, and spotting the finely dressed surfaces during age and exposure. But the defect of recent green-cut redwood by no means impairs the strength or durability of most of the timber from middle and lower sections of the Coast of California. This timber is cut all the year round; nor, so far as we are aware, does it seem to make much difference in what moon or condition of sap the trees are felled. At least, we believe it is conceded on all hands, that no insects, to speak of, ever molest the living trees, nor none the matured heart-wood when cut. This is all the more surprising, because the wood has neither the resin of pines, nor the usual oil of other cedars. However, there will be some open questions for wiser governments, or able and worthy, probably some self-sacrificing scientist of the future, to determine.

No unqualified statement in a general way can be expected to cover all cases, as we shall try to illustrate more fully in the sequel; but as board lumber it is classed with the soft and light, also liable to split if carelessly nailed. Choice curled-grain lumber takes a fine polish, and is very ornamental for cabinet and fancy finishing, and a thousand similar purposes; as simply stained or only varnished, it is found far preferable to paint; these variegated, grain-sheened, and delicately toned hues deepen to richer and darker shades with age—of these we shall treat more at large in our concluding detail. The well matured heart-wood of the base of these trees is so solid as to sink in water—hence designated as "sinkers;" * also as "butts," that is, for the few "first cuts," as the logmen express it. These will last for ages under the most trying circumstances, like the best cedars and yews, as unnumbered examples would serve to show. Yet timber taken from the upper part of the same tree may prove perishable, or far less lasting; and notwithstanding it is softer, light and brittle, is well suited for sheltered or inside work; takes paint readily, or, as observed, varnished, is finer still; and, what seems quite remarkable, no insects ever trouble any of it. From these observations it would seem to be a great error, too common, to judge of or choose timber by *name* rather than by selecting the proper *quality*.

The best practicable test for the purchaser in the lumber market is the weight per square foot, board measure.

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* Redwood logging, from its peculiar topography, has been greatly changed of late, on account of the expensiveness by loss and otherwise, by steam, railroads, and horse or cattle track tramways affording greater facilities and cheaper transit.

Redwood ranges from two to six pounds. It is safe to say, then, that timber weighing five pounds to the square foot of board measure will, at least, last nearly a half century under the most trying circumstances. As we have seen at Fort Ross (now of the property of Meyers & Bennet), recently mentioned in the "Rural Press," the timbers of the stockade, still in the ground, after sixty or seventy years are as sound as ever.

The same authority notes a picket fence now standing on the premises of J. P. Springer, of Santa Cruz, built in 1841, yet perfectly sound today. These redwood pickets, usually rived three to five inches wide by an inch thick, were driven into damp ground in a very foggy-infested locality.

Many instances could be mentioned of our own personal knowledge, although only of pioneer experience on this coast. As an instructive example illustrative and confirmative of some preceding remarks, is the case published in the "Press," since similar statements published by us prior; but all testimony alike will justify the public estimate put upon this timber, when duly selected with regard to *quality*. The case is that of a corral built thirty years ago from the timber of a single tree. They began cutting and setting stockade posts from the butt of the tree, working upwards. Now, the first posts to rot were from those of the top of the tree, and the succession of decay followed around the corral until the posts from the lower trunk were reached, and these are now sound as ever.

Our experience and observations some years ago on the

Dolbeer & Carsons.

Earthquake Committee, to examine the wood foundations of certain Front Street buildings damaged thereby, exhibited the folly, as stated previously, of choosing timber for important purposes simply by *name*. No one at all familiar with ship-building would be likely to make these mistakes. It is true, our own knowledge and experience is far from being equal to solve all queries with regard to this or any other timber of the coast; but, as in duty bound, we may possibly assist others towards their solution. If the question, for any reason, should arise whether the stump-spurs were equal in durability with the best heart-wood of the trunk of a chosen tree, we would not feel altogether able to answer it with such absolute certainty as to suggest to any one the utterances of the ancient oracles. Although some of our statistics are borrowed, and certain statements quoted, they are believed to be proximately correct. We know trees twenty feet in diameter—there may be trees larger—we hope to be able to photograph them. We have spoken of stumps cut twenty feet from the ground, because we have seen them, although at our northern limit of the forests, two to fourteen may be the range; or, at Humboldt Bay, where larger trees abound, five to sixteen, or even more. The largest board, we believe, brought to San Francisco is 13x7 feet, and three inches thick. If for any reason a larger were required, this could be greatly exceeded. This Humboldt Bay specimen is to be seen at Kentfield & Co.'s pier, 9 Steuart Street, San Francisco. Some of the larger trees are reported as yieleing 65,000 feet of lumber, amounting, at market rates, a single tree might be valued at $1,000.

Redwood really so nearly covers all our houses and outside work generally, as scarcely to leave an exception; that is, in the form of rustic, siding, batting, shakes and shingles, and even inside finish, such as tongued and grooved ceilings, and to some extent flooring, besides much furniture and cabinet work, largely; also, as wainscoting, cornices, mouldings and the like, besides an immense amount of rail ties, and all sorts of fencing—in short, everywhere, when removed from great strain, or much friction, and where great durability is required. There is, also, little timber known that equals its resistance to climatic changes and to trying exposures.

But now—nearing their exit—as these mighty monarchs bow their departure from the boards of the *Great Theatre*, we are fain to recall the sacred prophet's divine apostrophe: "Howl, fir tree, for the cedar is fallen!" The shocked earth doth groan and murmur her moan at the sound of their fall! Prone, and full oft crushed to the earth, they lie the lengthened ruin of a thousand years! hopeless, yet reaching out abroad; here and there broken, shattered and spread along the vale! Anon in solemn state they join the fated procession and pass away! Canst witness the sad havoc, and feel no pained interest—nay, great solicitude? How shall these great storehouses of uses manifold be again restored? Where now is the repairer of the breach into by-gone labors—the restorer of the ancient wise paths to walk in? Our German exemplars are never allowed to cut down one, like these, without planting and cherishing another! Therein we behold, at least, some small offering of acceptable incense upon the altar of justice—a right reverend regard to the sacred obligations of love—love to the generations of this world's neighbors, to say nothing of the higher, ennobled and grateful duty to the ALL-LOVING LORD on high.

What if these be the timbered types and shadows of a Nation's Day—of its glory and its greatness!—for the day goeth away * * * the shadows of evening are inclined! —the darkening death-pall cometh down over the land!—none to stay the spoiler and the waster, or say, "Thus far but no further." Thank heaven, there is yet left a little living hope of the root; as it were living fountains of another forest, if we no longer go to add unto our consummated crimes, misdemeanors, and shortcomings, the horrors of Sylvan infanticide! There is always a semblance of ganglionic conformation of tortuous grain, involved and apparently errant from its natural course of growth, at the foundation of every new departure; not necessarily irregular, revolutionary, disorderly, nor chaotic, in the worse sense. Similar curl-grained, bird's-eye remains we see at every fork or branch as well; therefore in redwood as in all animate and inanimate objects everywhere—and vital kingdoms more manifestly—do we observe this wonderful arrangement for this conservation or modified reactive basis of vital force. This evolutionary remnant, or reserve, finds its actualized types or analogies universally existent. It is the equivalent of hibernation of worms, reptiles, mammals, etc., etc. In short, wheresoever we turn our eye, this arrest of directness of purpose we imitate by artificial scarring; seen, also, in several cypresses, and in great natural depreciation. Hence depauperation, nodulation of roots, crowding native or new soils familiar to the pioneer grubber, and so proof of this law. Young and thriving redwoods of spire-tops are sometimes seen, which would be admired for their beauty; indeed, they seldom get a suitable footing in the nursery; and planted only a little inland the chief fault is paucity of branch and sparseness of foliage, which makes them appear too open, lank, loose and meagre; a display not at all pleasing viewed apart from the forest, however grand and imposing they may become with age in their native haunts. Besides, the hue of green is not sufficiently vivacious, although becoming enough in old age, sobered with the faintest touch of gray.

In conclusion, we may say that cone-bearing trees have always a minor key-note of somewhat sombre, if not serious and sad; "like memories of joys that are past!—pleasant and mournful to the soul!"; wooing to intro and to retrospection; for they are the great relics and representatives of a by-gone age, nay, æons of ages! If, therefore, thine ear be attuned to catch the celestial psalm they sing of a golden age, they have a mind to thee when into their forest thou goest, musing * * * *con amore*. Or, at least, let us list to soft prophetic songs tiding the falling raindrops from some far-off shore. Anon come her echoes of silence, swelling and vanishing, as Nature's love-songs sweetly die along the breeze.

My lyre is found in the mountain wood,
  Hung high in the forest tree,
And soft is the music all the day
  That laps me in its sweet control;
Yet other airs than Nature's play
  Æolian vespers to the soul.

—*after Holcombe.*

THE MAMMOTH TREE.

Sequoia Endlicher, Redwood Mammoth Cedar, the botanical name of the genus of the largest coniferous evergreen trees known. consisting of only two living species, both of the Pacific Coast of California, named by Endlicher in honor of the Cherokee Indian Chief Sequoiah, or George Guess (see Guess), inventor of the Syllabic Alphabet of his tribe—a graduate of Cambridge University, Mass.

The first species, discovered by Menzies in 1796, was the Redwood, and from imperfect specimens referred to, *Taxodium* of Don, the genus of our great deciduous Swamp Cypress, mainly of the southeast Atlantic Coast. Endlicher, however, found that it did not belong to this subsection of the cypress kin, but that its affinities were with pines, and especially cedars; hence the origin of this genus.

They are generically distinguished by the male and female floral aments on the same tree, on the tips of twigs, or axillary on young shoots; their scales spirally arranged; the tiny male flowers globoid, three to six anthers under each sub-shield-like scale, pollen grains simple. Fertile ones oblong, erect, with three to seven inverted ovules at the base of the scale; cone maturing the second year, egg form; the scale at right angles from the axis, thick; the inner, concealed part broadly wedge-shaped, and strongly attached to a woody center; the diamond disc roughly puckered; these radiating wrinkles indrawn by the quilted, navel-like centerpoint, laterally transverse-ridged, like many close-coned pines; seeds, three to five (rarely seven) to each scale, flattened, subrhombic-circuloid, being mostly obliquely wing-margined; middle body part narrowly wedge-like, often very short-pointed in the slightly notched, outer, larger end: in short, apt to remind one of small parsnip seed.

Colossal trees, of straight, columnar trunk, and short, spreading branches; leaves two-rowed, as in the yew and spruce, or merely scale-like, as in cedars; bark, cinnamon-brown, very thick, readily splitting longitudinally, shreddy-fibrous, spongy and light.

S. gigantea, the Great Washington Cedar, popularly known as "Mammoth Tree," and the groves as the "Big Trees" of California.

A few facts seem needful to be known relative to the earliest discovery and identification of this second species. As historic truth demands, it is but just to say that Dr. Kellogg took Mr. Lobb to the California Academy of Sciences, and showed him the first specimen he ever saw of this marvelous, now world-renowned,

WASHINGTON CEDAR,

Agreed to be so named by mutual consultation at that time. In this discussion Mr. Lobb coincided with the writer—if he did not originally suggest—that, being the "Father of Cedars," it might well commemorate the "Father of His Country." Objections were strongly urged by a nameless citizen, on the ground that no botanical specimens ever bore the names of military men, etc., but at length a prepared report of the committee to whom the subject was referred was made unanimous, recommending that if, in case of further investigation, it should prove a distinct genus from the common redwood, it should be called *Washingtonia*. Mr. Lobb was, therefore, well aware of this conclusion, and the deliberations pending before the Academy's committee on the subject. These facts are well known to the old charter members of that scientific institution, several of whom are still living. It is, therefore, the earliest among authoritative common names, and claims precedence, by all courtesy, in point of time, as also in appropriateness of honor.

Imperfect specimens were presented to the Academy in 1852, or early in 1853, and recognized as probably belonging with the redwood. Finally, flowering specimens coming to hand, Drs. Kellogg and Behr rightly confirmed and published it as *Taxodium* of Don, a congener of the redwood, which it was, according to that authority, May 7th, 1855, three months before Torrey's reference, adding a new species—*giganteum*.

To the historian of the future, who will not be likely to stick in names, and slip in mere technicalities, they may well confide their just claims. (See Pro. Cal. Acad. Sci., vol. III, 1863-8, pp. 399, etc.)

A full history of this wonderful tree cannot be given here. Suffice to say, briefly, (for in this we chiefly collate from J. Muir, who has best said, substantially):

The great Sequoian timber belt lies along the Sierras upon the first exposed mountain-side moraines of recent retiring glaciers, that face the Pacific from Calaveras on the north, to near the head of Deer Creek on the south, a distance of 200 miles, or just above 38° N. to a little below 36°; altitude 5,000 to 8,000 feet—rarely 8,400 feet—broken by two gaps, each forty miles wide, caused by manifest topographical and glacial reasons given—one between Calaveras and Tuolumne, the other between Fresno and King's River. Thence the vast forest trends south across the broad basins of Kaweah and Tule, a distance of seventy miles, on fresh moraine soil, ground from high mountain-flanks by glaciers. These inscriptions—for we have often examined them, guided by Mr. J. Muir—are scarcely at all marred by post glacial agents; and the contiguous water-worn marks are often so slight in the rock-bound streams as to be even measured by a few inches!

Rarely, very rarely, do these sound and vigorous cedars fall, but if so they lie 800 to a 1,000 years, scarcely less perishable than the granite on which they grew! The great Sequoian ditches dug at a blow by their fall, and the tree tumuli always turned up beside the deep root-bowls remain; *but not a vestige of one outside the present forests has yet presented itself.* Hence the area has not been diminished during the last eight or ten thousand years! and probably not at all in post-glacial times. The notion, therefore, that this species tends towards extinction more than others, or the planet itself, seems absurd; for its vital vigor is assured in ages past and present, and, so far as mundane things can be, to come.

These colossally sublime *Sequoias* rise 275, 300, or even 400 feet aloft; are twenty, thirty, and in some rare cases forty feet or more in diameter! as vast columnar pillars of the skies! No known trees of the world compare with them and their kin, the Redwoods, for the focused proximity of such a marvelous amount of timber within limited areas, as it were, the *ne plus ultra* standard of timber land capacity. Nor is simple narrative alone adequate to impress upon us any due realizing sense of such vast tree-magnitude, without the aid of comparative and associated statements. Thus, the stage-coach passes through one; one hundred and twenty children and a piano crowd inside another; a house for cotillion parties to dance—"stout on stumps";—horse and rider travel far within the burnt-out hollows of others; and so with variations: or spanning out a single tree, would furnish two-rail fencing twenty ~~to~~ thirty miles or more. Having often visited these groves, a word may be allowed relative to their sylvan claims, apart from lumber and cord-wood contemplation. Familiar ~~as~~ we all are with their ready growth into sturdy, conic, juvenile trees, with an exceedingly broad swoop of base, we pass to those of columnarly towering spiry-topped youth, say, of a few hundred years or so; then, at length, we behold, face to face, the GREAT WASHINGTON CEDAR in its prime! or thence again, to the greatly grand and picturesque with the ages! To our view, their expression is one of softened and more lovely beauty with advancing years. Vastness harmoniously merges into dignity and elegance. Even the most picturesque patriarchs, with here and there huge arms thrust out towards the horizon round about, never exhibit the wayward vagrancy of many other trees; but so soon as they approach the appropriate outline of towering symmetry, swoop upwards in one grand, triumphant air of sublime attitude, their bright and burning arms aloft appealing to Jove's high throne in the heavens! The lesser and more massed branches accumulate above in ever refreshing variety, insphering the upper body and crowning the venerable-domed head and massive brow in a halo of softer, serener glory! fragments of special foliage in rounded or varied tufts and touches, tiny-buttoned bouquets of beauty, as it were, pinned on gracefully here and there for effect, to foil herculean brawn; so in least as in largest, to fill and soothe the sense; the tiny, tender, slender, and delicate little sprigs even hiding the finishing hand that gives the final grace of the Great Artist! forcible reminder of the light, gauzy texture-lines of the finest figures of earth-born artists; but *these* drawn by hallowed hands on the celestial canvass, pictures of inimitable grace and beauty graven on the blue tablet of the skies! But who will bring words to describe that great behemoth-like hide of bright cinnamon-brown bark, in massive mantle folds one to two feet thick, consisting of compacted, shreddy fibres, darker on the shady side, or in youth and early prime tinted in royal purple; nay, crimson-fired in the lingering smiles of the setting sun's adieu! Then behold it flowing into large, deep, water-lined troughs, as it were, careering silently on a smooth bed adown the mountain height, until broadening and free, they serenely glide into the great earthly sea!

The general hue of young trees becomes of a somewhat soft, invisible sea green, or delicately blooming tint; but when the venerable foliage ripens into its golden age of glory, it dons a yellowish green. When these and other cone-bearing forests are in their spring bloom, the gently rolling breezes waft the golden pollen or yellow-folded clouds everywhere among the trees; or, in this genus, as with firs and pines, higher and spirited aloft the pollen clouds drift along high up over common tree-tops. Nor have firs any fruit save on their tip-tops: thus this sulphur-like dust is often carried by storms afar, and precipitated by rains, marking the margin of pools, in footprints and ruts of roads, etc. Hence, some legends of sulphur showers.

Finally, in all due homage do we accord to this "Great First Born of the Forest," not only priority in time, but in degree of estimation as to quality, preëminence at nameless points of view, as to state past, present and future (humanly speaking), whether considered as to use, magnitude, dignity, elegance or beauty; yielding the palm of these Pacific forests to this Sequoia, which is the "Great St. John Cedar" that never grows old, never decays, nor is ever diseased, and forever rallying in youthful vigor to repair storm-lost crowns; never known to die a natural death; Sylvan types of the *immortals!;* most natural visible emblem of loftiest celestial love-perception, from the purest good ground of a virgin soil. Begotten from above, and born on the mount, they do forever chant the everlasting songs of their Zion, singing their Seraph psalms and Selahs along the rolling ages. Towering pillars, these, of Jehovah's first and last temples! standing as ever, still before the face of the great earthly *Shekinah*—symbol of symbols of his glorious presence—for whatever He fires or illumines, lofty or lowly, there is hallowed ground!

"Solemn domes! within and far below
Like clouds at rest in an emerald sky!"—*Shelley.*